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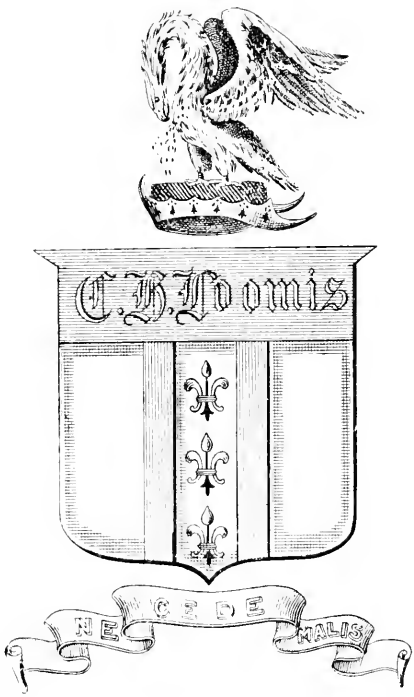
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HARDWICKE'S

SCIENCE-GOSSIP:

1886.

HARDWICKE'S

Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

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PREFACE.

THE necessity to pen a few editorial notes to our friends reminds us that SCIENCE-GOSSIP has been in existence for twenty-two years.

We are happy to say there are no signs of failing health—only of vigorous manhood. Our columns were never before found so strait for the matter sent us by hosts of willing and enthusiastic contributors, neither has the number or universality of our readers lessened; for SCIENCE-GOSSIP is known all over the globe. This is a great deal to say, when we remember the number of popular Science periodicals which have competed for public favour since our magazine was launched twenty-two years ago.

We have endeavoured, as far as lay in our power, to cater for every class of our readers—geologists, astronomers, botanists, entomologists, ornithologists, conchologists, microscopists, &c., as well as that large and undefined host of readers who are content to be fond of "Natural History." Where we have failed to please, we feel confident it has not been for want of good intentions.

In the present volume we commenced a series of monthly papers on "Astronomy and Meteorology," which we were fortunate to have written for our pages by Mr. John Browning, F.R.A.S., the well-known Astronomer and Optician.

Science is always increasing the number of its Gateways. Openings into the Unknown are familiarly used now which were never thought of a quarter of a century ago. Not the least interesting and suggestive of these are the real relationships between

Reason and Instinct, in animals as well as man. We do not refer to the old cut-and-dried and unstudied theories, which generally passed unchallenged in the period above mentioned, and which many people still hold by as unchallenged truths. We prefer to include all such mental traits under the term of "Animal Psychology," and propose to commence a special column in SCIENCE-GOSSIP next year for the record and discussion of authentically observed anecdotes of animal sagacity, perversity, &c.; in short, anything in the Animal Kingdom which relates to "The World of Mind." We feel confident that this will open out a new field of observation, and that henceforth our knowledge of animals will not be confined merely to their food, habits, colours, breeding-times, &c., but that something can and will be noted concerning their inner life. We invite our readers to contribute their own observations to this department.

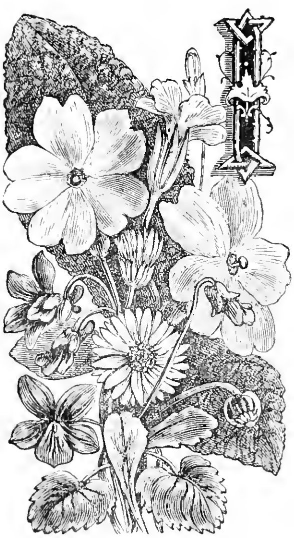
It only remains for us now to thank our host of friends for abundant help, kindly sympathy, and useful advice. Let us hope that at the end of 1887, we may have to close our Preface, as we close this, by wishing them, "hands all round,"

A HAPPY NEW YEAR!

LIST OF ILLUSTRATIONS.

AN ATTEMPT AT A SUBURBAN BRIGHTON GARDEN.

BY G. DAVIES.



I MUST preface these notes by saying the following has nothing new, and to a botanist or horticulturist they are worthless. Firstly, the space of my available garden ground is only fifty square yards. So all I claim is, that I have taken some pains in selecting suitable shrubs for the soil and situation; as my wish is to spread among dwellers in towns, the culture of these evergreens, and to induce others to abandon the palling monotony of the commonplace plants we usually see in such gardens as mine.

My conifers of the Pinus set are *P. Austriaca*, *P. cembra*, *P. excelsa*, and *P. insignis*. Here *P. Austriaca* succeeds best, then *P. excelsa*. Next the Abies, the silver fir, *A. Nordmanniana*, takes more kindly to this soil. *A. pinsapo*, the lovely little Spanish plant, is rather slow in growth, as also *A. montana*, *lasiocarpa*. The Cypress set, *Cupressus macrocarpa*, *C. Lawsoniana*, and *C. Nutkaensis*, developing two or three feet a year.

The allies *Cryptomeria elegans* and *Thuiopsis dolabrata* both luxuriate, the latter, a young plant three feet high, having both male and female flowers. Next comes *Retinospora obtusa*, producing a few young flowers the second year. The dwarf *R. ericoides* fills up a corner gap.

Juniperus Japonica flourishes extremely, but the dwarf *J. Chinensis* scarcely repays the trouble. *Araucaria imbricata* thrives beautifully if well syringed. *Biota aurea*, male and female, as this is a dioicous plant, and *Thuja occidentalis* are very popular and easily grown.

The sacred tree of China, the Maidenhair tree as it is called, *Ginkgo biloba* or *Salisburia adiantifolia*, is a great ornament, but very sensitive; at the first sharp autumn frost, say early October, the leaves shed. In the Botanic Garden at Geneva are two trees, one male, and one female, side by side, each thirty feet high. That beautiful plant, the umbrella pine of Japan (*Sciadopitys verticillata*), planted in September 1884, is now in beautiful condition, with forty-eight new branches of leaves.

Of the yews and allies, *Saxegothæa conspicua* is a slow-growing plant, as are *Podocarpus chilinus*, *Prumnopitys elegans*, and *Cephalotaxus pedunculata*, the latter alone showing flower buds. These are interesting as exhibiting the South American forms of this family. *Taxodium distichum* is more luxuriant; of this there is a fine tree near water at Horsted Keynes. *Taxodium* and the *Ginkgo* are interesting, as they are said to have been found in a fossil state in the coal formations in Scotland.

The most luxuriant and easily-grown shrub in Brighton is *Euonymus Japonica*, reminding one of the orange trees on the Riviera. Male plants are met with near warm walls. Near the sea it runs up the sea wall 30 feet high. Next in interest is the Japanese *Elæagnus glaber*, having more beautiful leaves.

Skimmia Japonica, *Pittosporum Tobira*, *Arbutus Unedo*, *Raphiolepis ovata*, *Phillyrea ilicifolia*, *Garrya elliptica*, *Mahonia Japonica*, *Berberis Darwiniana*, and *Olearia Haastii* are more or less pleasing, but *Photinia serrulata*, a Chinese member of the Pomaceæ, with its gorgeous shining leaves, is a great ornament.

Acanthus candelabrum is a beautiful evergreen, with root leaves, shining, and two feet from point to the ground, the young flower stalk is approaching three feet high.

Asphodelus luteus, last year luxuriant, now somewhat languishes.

In the open *Ptelea trifoliata*, the hop tree, or North

American shrubby trefoil, has had a mass of flowers. A French yellow Magnolia hybrid, planted two months, suffered from the sharp May frosts, as did *Chionanthus fragrans*, but *Chionanthus Virginica* is in full beautiful leaf, as is a bamboo, *B. Simmonii*: it is gratifying to find it grows so near the chalk soil. The Japanese ribbon-grass (*Eulalia Japonica*) is in a fine state of development, as likewise is the reed-like *Erianthus Ravennæ*. The Edelweiss, *Gnaphalium leontopodium*, in full flower, and eight inches high, makes one long to be at one of its homes at the head of the Valtellina. The popular *Tritoma uvaria* does well, if well watered, but flowers later; my plant last year had 13 flower spikes.

On walls, *Pyrus Japonica*, *Bridgesia spicata*, *Escallonia floribunda*, *Bignonia capreolata*, *Cratægus pyracantha*, *Mespilus microphylla*, and two jasmines all do well. But there are three notable plants, the common and luxuriant *Wistaria Sinensis*, the beautiful spreading *Eccremocarpus scaber*, for which latter I am indebted to my friend Mr. C. P. Smith, of Clayton Park, the skilled botanist, who has given me much valuable information. The third plant is the ornamental *Aristolochia sipho*. This singular plant, which flourishes so beautifully on garden walls at Reims, sends forth from the stem nodes at the same time, on bursting, both flower and leaves. Mr. Piggott, of Tunbridge Wells, the horticultural author and discoverer of *Graphis Ruiziana*, says *A. sipho* is named from its flower "the Dutchman's pipe." *Cobæa scandens* is another useful climber. Last year I planted four fig-trees, two white and two black. These trees as a rule flourish at Rottingdean, Brighton, Lancing, and elsewhere on this coast, bearing luscious fruit in hot summers; last year the slugs attacked the young bark and I lost two. The beautiful foliaged plant *Ceanothus* (*gloire de Versailles*) is a great ornament to walls. My plant is now seven feet high, the stem-tops are covered with clusters of young flowers, the colour of which is exquisite. In the limited space of ground it is singular to note the powerful effect of the sun. Many of us have noted the force of "actinism" as it is called, in developing the brilliant colours of flowers in the high Alps, that is from 7500 to 9000 feet above the sea. But here the shrubs on the sides nearest the sun have finer and better leaves, and my three plants of *Pinus Austriaca*, planted to mask a wall running east and west, have a progressive development each three inches higher than its western neighbour, and all were planted the same time, and were then of an uniform height. Again two Siberian crabs, *Pyrus prunifolia*, planted for convenience' sake against a wall facing west, the more southern plant has finer leaves, and forty set fruits; larger than those of its neighbour, which, getting less sun, has only thirty-five and much smaller.

These conifers and shrubs are better developed than in the surrounding garden, which I ascribe to my practice of daily lateral syringing, particularly in the dry months of the year, so necessary in our dry Brighton air; not flooding the ground as generally done, and leaving the foliage to take care of itself. These are an amateur's crude notions. It is possible another year I may jot down a few more notes, by which time, climate, soil, and "General Frost" will show how many I shall have to add to the list of "our failures."

NOTES ON NEW BOOKS.

THE Poet's Beasts, by Phil. Robinson (London Chatto & Windus). This author has imported a fresh interest into English literature. He has done for the poets what Frank Buckland did for the painters when he criticised their natural history at the Royal Academy. "Phil Robinson" is a marvellously wide and well read man, and it is surprising how intimate he is with all our English poets. His style is plain, incisive, and quaintly humorous—occasionally delicately satirical. The volume before us is a necessary work to the student of English literature, and the general reader will peruse it with keen enjoyment.

Wanderings of Plants and Animals, by Victor Hehn, edited by J. S. Stallybrass (London: Swan Sonnenschein & Co.). This is a well-edited translation of a very erudite and important work. The naturalist will be deceived if he thinks it deals with the geological and geographical distribution of plants and animals. On the contrary, Professor Hehn thinks the naturalist has had too much of his own way, and the historian too little. So, in the lights of philology and history, he endeavours to account for the wanderings of the plants and animals which have proved of the greatest advantage to mankind. Thus, he holds (and probably with reason) that Europe owes more to Asia than most naturalists imagine. Thus he takes the horse, vine, fig-tree, olive, ass, bear, flax, hemp, rose, domestic fowl, pigeon, &c., &c., as the subjects of his chapters. He traces their history, developments, modifications, in the hands of man. Altogether this is a most useful book to the historian as well as the naturalist. There is no evident method in the arrangement of the subject-matter. We jump from the horse to the vine, and from asses and goats to stone architecture, from cucurbitaceous plants to the domestic fowl, and from hawking to the plum-tree. Moreover, nothing is said about the vast number and variety of fossil horses in America, nor even of its modern introduction either into that country or Australia, in both of which it has become wild. The historical introduction of the pig into New Zealand, and of the rabbit, hare, sparrow, thistle, &c., into the Australian colonies, might also have been included with advantage in such splendid historical monographs as this valuable book contains.

From Paris to Pekin over Siberian Snows, by Victor Mignan. Edited from the French by William Conu (London : W. Swan Sonnenschein & Co.). This is a delightful work of travel, so well translated that not the slightest flavour of French humour is lost. The author is a genuine traveller, not a mere "globe-trotter." He has an observant eye—for scenery, politics, men and women (especially the latter). And then the ground traversed is so little known to the general reader—Lake Baikal, the deserts of Gobi, North China, &c. The work cannot fail to be popular.

Natural History and Sport, by the Rev. G. C. Green (London : L. Reeve & Co.). At first thought we felt there was more sport than natural history, more killing than observation, in this charming little book. We mention the feeling because others may think so too, and we hasten to say how sorry we afterwards felt for having unconsciously libelled a genuine and enthusiastic naturalist and true sportsman. Mr. Green sets down the delightful experiences, wanderings, and observations of such a happy and contented life, that we wish more people could live it. We feel, whilst reading Mr. Green's book, how much a knowledge of natural history can sweeten a human life.

A Manual of Health Science, by Dr. Andrew Wilson (London : Longmans). People, as they increase in intelligence, feel they have as much right to look after their bodies as their souls, and not to be content merely with entrusting them to the doctor and the parson. In what may be called the revival of public interest in Health matters, Dr. Andrew Wilson has taken a prominent part. The little book before us is a valuable one, and it sets forth clearly and plainly a comprehensive statement of the leading facts and features of sanitary laws.

British Zoophytes, by A. S. Pennington, F.L.S., &c. (London : L. Reeve & Co.). This is a valuable and neatly got up manual on the hydroida, actinozoa, and polyzoa, illustrated with abundant lithographs. Mr. Pennington has aimed to do for the present generation of students what Dr. Landsborough did so well for the last. Since Landsborough's time the microscope has become a working tool, and histology has grown up. Mr. Pennington has abundantly utilised all the materials at his service, and has laid Hincks, Busk, Allman and others under contribution ; all of which he honestly and frankly admits. In consequence he has produced a valuable and handy student's manual.

Myths and Dreams, by Edward Clodd (London : Chatto & Windus). A more delightfully written book than this we have not read for many a day. It steers clear alike of the Baconian method of mythological explanation and the Solar. Although evolutionistic Mr. Clodd does not even accept Herbert Spencer's ideas. For clear and clever and attractive treatment of subjects usually deemed dry and useless, we know of none which can compare with the little volume under notice.

Moon-Lore, by the Rev. Timothy Harley (London : Swan Sonnenschein & Co.). Our earth's "solitary companion, the moon," has left its mark on human character and literature. In mythology, legend, folk-lore, theology even — poetry, superstition—it would be difficult to find another natural object to excel the moon. It is a wonder nobody has collected all this varied matter together in a handy and readable form. At length it has been done, and, from what we have read, done well !

Proceedings of the Literary and Philosophical Society of Liverpool, vol. xxxviii. (London : Longmans). We are always pleased to receive the neatly got up annual volume of this well-known society. It is sure to contain papers full of original matter as well as original research. Among those of exceeding interest in vol. xxxviii., are the following : "Descriptions of recent additions to the Liverpool Museum," by Mr. T. J. Moore ; "Mind in Man and the Lower Animals," by R. Steel ; "Museums of Natural History," by H. H. Higgins ; "The Flora and Fauna of Oceanic Isles," by R. J. H. Gibson ; "The Introduction of Peruvian Bark into India," by Dr. J. B. Nevins, &c.

Recherches Anatomiques sur les Organes Végétatifs de l'Urtica Dioica, par A. Gravis (Bruxelles : Librairie Scientifique de A. Manceaux). In this original work Dr. Gravis has really prepared a kind of botanical typical basis for the study of the natural order *Urticaceæ*. Every detail, histological, physiological, and morphological, of the type-plant is elaborately dwelt upon ; and outsiders would little imagine that any botanist could devote 260 quarto pages, and 23 beautifully got up plates, full of structural details, to so ordinary a plant as the common nettle !

The World's Lumber-Room, by Selina Gaye (London : Cassell & Co). This is an unfortunate and unattractive, as well as an inexpressive title for the nicely got up book before us. It deals with everything it is possible to find in a "lumber room,"—dust, beetles, fossils, corals, &c. &c.

Short Studies from Nature, by various authors (London : Cassell & Co.). A very attractive and readable volume on natural history subjects ; the "various authors" are all men of mark, and skilful writers withal, such as Dallas, Buchanan White, Robert Brown, &c.

Where to find Ferns, by F. G. Heath (London : The Society for Promoting Christian Knowledge). Mr. Heath is the Apostle of the Gospel of Ferns, and a very taking one too. But we hope he won't tell too much about them—at least not about the rarest and prettiest—or they will be certainly stolen. In that case Mr. Heath would reap his reward, for by the process of natural selection, there would be no ferns for him to write about so agreeably. In the

little volume under notice there is a special chapter on "The Ferns round London," which will be very useful to those who are eager to grub these pretty plants up.

Ocean Currents and the System of the World, by W. L. Jordan (London: Longmans). The author is a bold, ingenious, learned, and irrepressible physical geographer—one who is well aware his *confrères* do not agree with him, but who has the courage of his convictions, and the fortunate means of publishing them. The present volume is chiefly valuable as containing a full and complete outline of Mr. Jordan's hypothesis.

The Naturalists' World, edited by Percy Lund (London: Swan Sonnenschein & Co.), is the second volume of our pleasant and friendly contemporary, beautifully got up in every way, type, binding, and illustration, so that it will make an acceptable new year's present.

We desire to recommend the following little manuals: *Lectures on Heat, Sound and Light*, by Dr. Richard Wormell (London: Thomas Murby); *Chemical Students' Manual, for the lecture-room and laboratory*, by H. L. Buckeridge (London: Thomas Murby).

We have also received *Longitude by Lunar Distances*, by Major H. W. Clarke (London: W. H. Allen & Co.), a work of enormous labour; *The Aryan Maori*, by Edmund Tregear (Wellington: Geo. Didsbury), a bold and ingenious essay, proving the New Zealanders to be of Aryan origin. If the author's conclusions are accepted, he will have the merit of securing a high position as an anthropologist.

The Open Air, by Richard Jefferies (London: Chatto & Windus). This handsomely got up book is a collection of some of Mr. Jefferies' most delightful essays, reprinted from various magazines and journals. The author's style has placed his books among our modern classics, and there are few which will be read with greater pleasure than the present volume. The titles of some of the papers alone will convey to the readers who have enjoyed Mr. Jefferies' other books, some idea of their attractive character: "Sunny Brighton," "The Pine Wood," "Nature on the Roof," "The Haunt of the Hare," Under the Acorns," "Downs," "Haunts of the Lapwing," "Beauty in the Country," "On the London Road," &c. &c.

GREEN FLIES.—Your query in the September number reminds me of the following which I came across in a newspaper about the middle of August, and which, perhaps, may be useful. There was a plague of small green flies at Peterborough on Thursday. For an hour or two in the middle of the day Narrow Street was thick with them. In some places they fell on the ground an inch thick.—*A. G. S.*

CHAPTERS ON FOSSIL SHARKS AND RAYS.

By ARTHUR SMITH WOODWARD, F.G.S.

VI.

ICHTHYODORULITES. (*Continued*).

ACONDYLACANTHUS is a slender and considerably elongated spine, ornamented with more or less denticulated longitudinal ridges, and having posterior denticles; it is particularly interesting from the fact that its internal cavity opens only at the base, thus perhaps indicating an affinity with the Rays. No species appear to have been hitherto recorded from the upper divisions of the Carboniferous series, but Mr. Davis enumerates* seven forms from the lower strata of Armagh and Bristol, and several others occur in America†; the latter first led to the determination of the genus, Agassiz not having before noted its distinctness from the Mesozoic *Leptacanthus*, and McCoy having also been induced by imperfect specimens to unite it with *Ctenacanthus*. *Lepracanthus*‡ is a little richly-ornamented ichthyodorulite from the Coal Measures; and *Erismacanthus*§ (=*Cladacanthus*, Agassiz, MS.) is a peculiar three-branched type (fig. 1) from the Carboniferous Limestone of Armagh, very suggestive of the cephalic spines of certain Chimæroids.

Among the fossils of the Permian and Trias, there appear to be no fish-spines of an altogether problematical nature, but in the overlying Rhætic Beds there occurs a form whose relationships are still undetermined, and of which numerous fragmentary remains are met with in the well-known strata of Aust Cliff, near Bristol. This constitutes the genus *Nemacanthus* (Agassiz), and is readily recognised by its laterally compressed shape and striated external surface, with a thick longitudinal ridge of enamel in front, a row of denticles behind, and a few scattered tubercles of the same hard substance on each side towards the upper extremity. Two Rhætic species are known, the larger, *N. monilifer*, and the smaller, *N. filifer*—both from Aust Cliff—and the genus is further represented in the Stonesfield Slate by a very short form, known as *N. brevispinus*.

The Lias yields another interesting ichthyodorulite that has received the name of *Myriacanthus*, from the thorn-like shape of the large denticles composing each of the two longitudinal rows with which its external surface is characterised in addition to the scattered small tubercles; judging from its general shape, and the fact of the internal cavity opening only at the base, it appears to have belonged to an extinct type of Ray, and the original fish must have been of some considerable size, for some of these spines are as

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* Davis, *loc. cit.*, pp. 346–352.

† St. John and Worthen, "Geol. Surv. of Illinois (Palæontology)," vol. vi. (1875), p. 432.

‡ Owen, "Geological Magazine," vol. vi. (1869), p. 481.

§ Sedgwick and McCoy, "Pal. Rocks and Foss.," p. 628.

much as two feet in length. *M. paradoxus* and *M. retrorsus* are the larger species, and *M. granulosus* is one of a more diminutive kind. All occur at Lyme Regis.

But the most prominent of the Mesozoic ichthyodorulites is a form particularly remarkable for its ornamentation by star-shaped bosses of enamel, and hence termed *Asteracanthus*: so striking, indeed, is the appearance of this spine, that it was one of the earliest studied of fossil bodies, being described and figured in the Philosophical Transactions of the Royal Society in 1753, and quaintly referred to "the head or snout of some animal of the fish kind, or perhaps of some lizard, alligator, or crocodile." The genus is first represented by a few doubtful fossils in the Lias, but Agassiz has definitely determined species from several of the succeeding Jurassic beds, and Sir Philip Egerton* has also made known the presence of others in the Purbeck and Wealden. The largest and typical species—sometimes more than twenty inches long—is *A. ornatissimus* (fig. 2), from the Kimmeridge and Oxford Clays, and exhibits well the double row of posterior denticles, the extensive inner cavity, and the long base of insertion. Among the Lower Oolite forms are *A. semisulcatus*, occurring in the Stonefield Slate, near Oxford, and *A. Stitchburii*, in the Forest Marble of Dorsetshire; while the evidence of the genus in the Purbeck and Wealden consists in beautifully perfect spines of *A. verrucosus* and *A. semiverrucosus* from Swanage, and of *A. granulosus* from Tilgate Forest. The ornamentation is much finer in these Wealden and Purbeck species than in that of the Kimmeridge Clay, and the tubercles more closely crowded together, and the genus seems to have completely disappeared before the commencement of Cretaceous times.

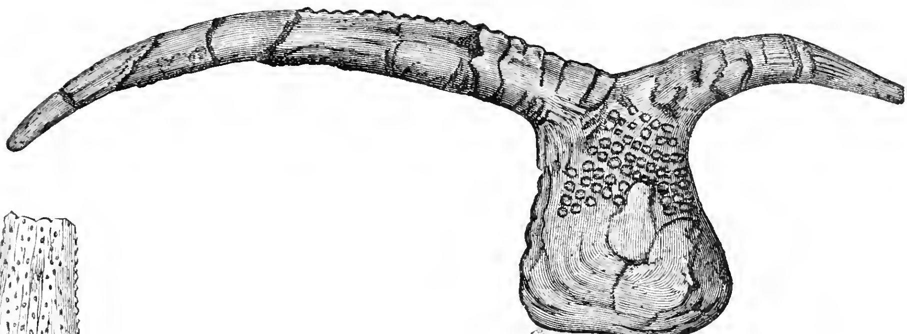

Fig. 1.—*Erismacanthus Jonesii* (after J. W. Davis).

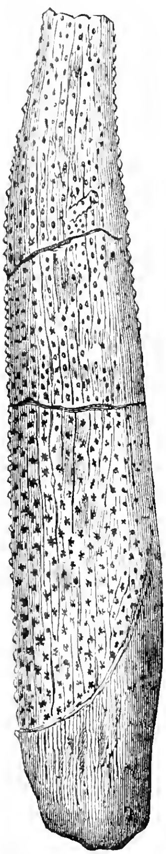

Fig. 2.—*Asteracanthus ornatissimus* (half nat. size, after Agassiz).

It is curious that hitherto there have been no recorded instances of the discovery of *Asteracanthus* in intimate association with teeth or other Selachian structures, and nearly fifty years have thus passed without our advancing beyond the mere surmise of Agassiz, who thought that *Strophodus* might eventually prove to be the dentition of the same cartilaginous form; Sir Philip Egerton, however, in describing the Purbeck spines, has pointed out that such an idea can scarcely be probable now, since *Strophodus* is quite unknown in the well-explored strata of Swanage, and more complete evidence must yet be awaited before there are grounds for removing the genus from its present provisional place.

We have now reached the end of the task proposed in our programme of August, 1884,* and would venture finally to express the hope that this cursory glance at the present state of knowledge in regard to the past history of Sharks and Rays may not be without the result of contributing, however slightly, towards its advancement. It has been our endeavour, as far as possible, to indicate where present information is most defective, and where those who are the fortunate possessors of fine specimens and yet have not access to the more abstruse literature of the subject, will be furthering the cause of biological science by making them known; and the writer will deem it a favour and a pleasure to be informed of the existence of such new materials, and to furnish more precise particulars concerning any of the facts or inferences briefly touched upon above.

APPENDIX.—It has not been thought necessary to give detailed references to the great work of the founder of Fossil

* Mem. Geol. Surv., Dec. VIII., pl. i.-iii.

* The articles of this series have appeared as follows:—1884—August, October, December; 1885—May, July, October, December.

Ichthyology; wherever the name of Agassiz has been mentioned in connection with nomenclature or observations, his "Recherches sur les Poissons fossiles" (Neuchatel, 1833–43) may be consulted; this treatise forms the basis of all subsequent research.

Besides those in Agassiz' "Rech. Poiss. Foss.," good figures and descriptions of the teeth of fossil Carchariidæ, Lamnidæ, and Notanidæ, will be found in the Journ. Acad. Nat. Sci., Philadelphia, 1848–9 R. W. Gibbe's "Monograph of the Fossil Squalidæ of the United States," Parts I., II.); and an elaborate "Studi Comparativi sui Pessi Fossili coi Viventi dei Generi *Carcharodon*, *Oxyrhina*, e *Galeocerdo*," by R. Lawley, was published at Pisa, four years ago.

A new species of *Carcharodon* (*C. longidens*, Pillet), from beds in Haute-Savoie, supposed to be equivalent to the Maestricht Chalk, was described and figured in the Mém. Acad. Sci. Savoie, [3], ix., 1883, p. 277.

Since our remarks on *Psephodus*, Dr. Traquair has published an important contribution to the subject, noticed in the present volume of SCIENCE-GOSSIP, p. 190; and we also ought to mention particularly the valuable "Illustrated Guide to the Fish, Amphibian, Reptilian, &c., Remains of the Northumberland Carboniferous Strata," by M. T. P. Barkas, F.G.S. The latter appeared in 1873 (partly reprinted from the "Colliery Guardian," 1871), and was followed by several articles from the pen of Dr. W. J. Barkas in the "Monthly Review of Dental Surgery" for 1874–76—an unfortunately inaccessible series, said to contain much information regarding the microscopical structure of the teeth of Coal Measure fishes. Carboniferous Selachians likewise form the subject of a new volume (1883) of the Geol. Survey of Illinois Reports, in which Messrs. St. John and Worthen enter into a detailed study of the Cochliodontidæ and Psammodontidæ.

GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

SCIENCE IN JAPAN.—Those who imagine that the recent awakening and progress of Japan is merely a superficial imitation of external Western customs should study the records of the Scientific Societies of that country. Important researches are continually recorded. I have already referred, both in this and the "Gentleman's Magazine," to the fact that Tokio has become the headquarters of the systematic study of normal every-day earth-waves and abnormal movements reaching the magnitude of earthquakes. These are systematically observed and registered there with improved instruments of great delicacy, some placed on the ordinary surface of the plains, some on mountains of various elevations, and others underground in coal-mines.

In the utilisation of coal-mines for scientific research the Japanese have already left us far behind, in spite of the great development and antiquity of our collieries. Subterranean electrical currents; microphonic and telephonic examination of the sounds produced by the movements of solid rock; comparing seasonal earth-waves underground with those they have already observed on the surface; the action of the tides upon the roof of workings of the coal-mines under the sea, and measurement of the delicate tremors indicated by a tromometer devised for the purpose, are some of the scientific work that is being carried on underground.

It is rarely that a monthly number of the "Journal of the Chemical Society" fails to contain one or more interesting communications from Japan, such, for example, as that which I have just turned up in the October number, entitled "A Chemical Examination of the Constituents of Camphor Oil, communicated from the Chemical Society of Tokio by Hikorokurō Yoshida, Chemist to the Imperial Geological Survey." It is a research supplying much new information, and quite free from the chemical pedantry which I described last month. I dare not venture to refer to details, but may state that the liquid distilled out in preparing solid camphor is a sort of turpentine, which mixes in almost every proportion with ether, chloroform, alcohol, and most of the essential oils; that it dissolves several resins, such as colophony, gum elemi, mastic, balsam and asphalte, and therefore is suitable for the preparation of varnishes. I presume that it may also be used as a substitute for turpentine in diluting the linseed oil medium of ordinary oil colours. Its aroma being agreeable, the advantage of using it is obvious. Being a bye product from the crude material, it may probably be produced at little cost if in regular demand.

ELECTRIC FISHES.—Professor Du Bois Reymond has communicated to the Berlin Academy of Sciences and to "Naturforscher" the results of his long researches on the electric organs of the torpedo. One of the most remarkable of these is the variation of electrical conductivity of this organ in opposite directions. If a current is passed from the belly of the animal to the back, i.e. in the same direction as the animal electricity is generated, it meets with less resistance than if passed in the opposite direction. The first of these is styled by the professor a homodromous current, the second a heterodromous current.

The deflections of a galvanometer needle when a current from an induction coil was passed in these opposite directions, was 100 for the heterodromous current, to 224·7 for the homodromous. The difference diminished with a weaker and weaker current, until it became imperceptible. The longer the part of the organ that was included in the circuit, the greater the difference or "irreciprocity."

The electric organ of the torpedo was found to conduct twice as badly in a homodromous direction as the muscle of a frog in the direction of its fibres, and 7·5 to 12 times worse than the water of a marine aquarium. In the heterodromous direction it conducted 20 to 58 times worse than sea-water.

I took a shock from the electrical eel that was brought to London and exhibited many years ago, and remember well that I was struck before my hands actually touched the animal; the communication took place through the water. It is obvious that in order for this to occur, the electrical organ of the fish must be a worse conductor in the heterodromous direction than the sea-water, or the current would return upon itself instead of passing through the water. In this case it was fresh water, which is a far worse conductor than sea-water.

The experiments of Du Bois Reymond show that this resistance to conduction and its irreciprocity are vital properties, as the dead structure of the electrical organs conducts equally in both directions, and more readily than a saline solution.

The irreciprocity of conduction of the electric organ of the torpedo is limited to currents of brief duration, like those which result from making and breaking contact in induction coils. It does not occur to continuous direct battery currents. This special adaptation to the requirements of the animal is very interesting. Its own electrical efforts are spasmodic. It supplies no continuous current.

Water and Chemical Combination.— A curious chemical fact has been recently demonstrated by Dixon, viz. that mixtures of perfectly dry carbonic oxide and perfectly dry oxygen are not exploded by the passage of electric sparks through them, and it appears probable that even a mixture of hydrogen and oxygen is similarly inexplosive without the help of a minute quantity of already combined water vapour. The cause of this is still under discussion. Traube connects it with the formation of peroxide of hydrogen. However this may be, it is a curious paradox that water which we use for the extinction of common combustion, i.e. the union of carbon with oxygen to form carbonic acid and the union of hydrogen with oxygen, should be necessary to effect this same combustion. It presents us with a chemical instance of "similia similibus curantur," but in this case the conflagration mischief is promoted by the infinitesimal dose, and the cure effected by very large doses of the same.

Coal in the Arctic Regions.—Lieut. Greely has found more coal in the bitterest frozen regions within the Arctic circle, besides the remarkable seam of Grinnell Land. Also a fossil forest near Cape Baird in 1° 30' N. latitude. The coal seams are displayed in outcrop or section at the surface, and thus are visible to the mere passer by without any of the laborious search by boring and sinking which are necessary for the proving of our coal at home. If the hidden or covered coal is proportionally abundant, Greenland must be a remarkably rich coal bearing region.

These facts suggest much speculation; the first that thrusts itself most obviously forth, being that of a shifting of the earth's axis within the earth itself, but this is demolished without mercy by fundamental dynamic law. The earth is a spheroid of rotation and such a spheroid can only rotate freely on its shortest axis. In order to shift the present axis we must either build up a mountain 13¼ miles high at each pole, each with a base extending about half way to the equator, or shave off a corresponding thickness from the equator and on each side of it, or do half of one and half of the other, in order to make the earth a sphere that shall turn indifferently on any axis within itself. Even after this, a further force to shift to establish direction of rotation would be required.

The other idea that has been much discussed, viz. a tilting of the whole globe as it continues to turn on its present axis so as to present it differently to the sun, presents very serious dynamical difficulties which those who best understand the subject the most fully appreciate.

For my own part, I am not by any means satisfied with the prevailing notion which demands a sub-tropical climate for the formation of coal. In "Science in Short Chapters" (pp. 90 to 93), I have described the deposition of coal that is in actual present progress in the Nordals and other Norwegian fjords within four degrees of the Arctic circle, and I have no doubt that similar deposits may be found much further north, and therefore no very violent alteration of climate is demanded to explain the Greenland coal. We require to know more about the kind of fossil vegetation with which it is associated, before assuming that the coal itself was formed by vegetation demanding a climate very different from that which supports the existing Siberian and Norwegian forests.

Natural Gas Fuel.—The iron trade of the United States is in a state of considerable excitement, on account of the successful application of natural gas to smelting and forging. "The Petroleum Age" tells us that "this invention seems likely to revolutionize the smelting of iron, steel, and glass in the United States." Doubtless it will if the supply continues for any considerable length of time, but this is very questionable, as the natural gas is but the more volatile portion of the petroleum below, and constitutes only a small percentage of it. When the explorers first "strike ile" in a particular pocket or subterranean cavity, the vapour previously confined there usually rushes up the bore-hole with great violence; tales are told of boring tools being thrown up in the air, &c. &c. These may be accepted with as many grains of salt as may suit the reader's taste. Certainly the force of uprush is great, but it rapidly diminishes, and the spouting well becomes next a flowing well, and then a well that must be pumped in order to obtain the liquid petroleum. There are issues of natural gas which have continued for ages, but these are small in volume, sufficient for the altars of fire worshippers, but not for forging and rolling thousands of tons of rails, plates, &c.

The gas is used by first mixing it with the quantity of air which is necessary for its complete combustion, and then throwing the barely visible flame thus obtained directly upon the metal. Such a flame is not like that of a candle or lamp or of ordinary gas burners, all of which are hollow shells of flame enclosing gas that is being burned only on the outside. The flames used in the furnaces are what are called

"solid flames," an awkward name, inasmuch as a gaseous fluid is not a solid. "Solid," when applied to a flame, merely means not hollow.

Petroleum Vapour Fuel.—Another kind of gas is similarly used. This is the vapour of a volatile distillate of petroleum, that which is too volatile to be safely used in ordinary lamps, and which bears the commercial names of gasoline, benzoline, &c.

The vapour is obtained by simply passing air through the liquid, the air thus becomes saturated with the vapour, and supplies the oxygen necessary for its combustion. As the volatile liquid the "petroleum spirit" is almost a waste product, has at times been burned in the open air to get rid of it, fuel of this kind is cheap enough in petroleum-yielding regions, such as Pennsylvania and Baku, &c. The steam packets of the Caspian are now regularly supplied with petroleum furnaces, where either the vapour is burned in this manner, or jets of the liquid hydro-carbon itself are mixed with air, and thrown in blaze upon the boilers. Attempts have been made to introduce it in this country, but they have failed simply because here it costs more than coal. The cost of carriage from the American wells is about sixpence per gallon—or £6 per ton. One ton of oil does the work of about $1\frac{1}{2}$ to $1\frac{3}{4}$ tons of coal. Some have claimed double, but this is questionable.

In time of naval war it may possibly supersede coal for some purposes, as steam may be got up more rapidly with a petroleum furnace than with coal.

ACCESSORIES FOR MICROSCOPICAL DRAWING.

It has often happened to me (and I expect many persons have experienced the same difficulty), when wishing to draw a mounted object under the microscope that the object was not placed exactly in the position in which one wishes to draw it, and to so place it, the slide requires raising at one end or side. I knew of no apparatus for effecting this when the object was a transparent one, and lately, when making some drawing with a camera, I was much bothered by some of the objects not being quite truly placed. After a little consideration, I devised a very simple little piece of apparatus which effects my purpose admirably, which I will describe, as others may also find it useful. I cut a piece of thin wood (part of a cigar box), a little larger than an ordinary slide, and made a hole three-quarters of an inch square in the middle of it. About half an inch from either end, on what I intended to be the lower side, I cut a narrower transverse groove, and then slipped an indiarubber band over each end until it reached the groove. I then took the slide I wanted to examine and placed it on the wooden one under the elastic rings, then, by inserting a wedge between the wooden and other slide at the proper part, the object can be placed as desired. This little device is also useful in enabling one to see portions of an object which one would not otherwise be able to do.

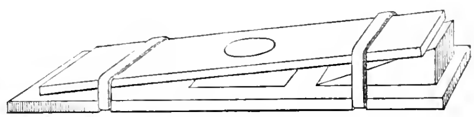

Fig. 3.—Apparatus for Microscopical Drawing.

I devised a very simple contrivance for placing an unmounted object in any desired position on the stage of a microscope. It will effect more when placed on a rotating stage than Messrs. Beck's little mechanism, which I think they call "a rotating disc holder," and at only a quarter of the price: it is difficult to describe it accurately, but the figure shows its action. By turning the milled head the object can be moved in a direction transverse to the apparatus, and by moving the other hand in or out, the object can be moved in a longitudinal direction. If to these movements be added that given by isolating stage, the object can be viewed in any aspect without removing it from the instrument. The hole in the vertical tube can be fitted with a cork to hold pins; a small pair of forceps or a piece of wax can be used to hold a geological specimen. Messrs. Baker & Co., 243 High Holborn, are the makers of this object holder, for which they charge 5*s*. I have used this instrument a great deal, and I find it is most useful, and that it works in a very satisfactory manner.

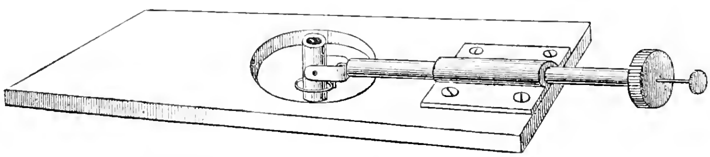

Fig. 4.—Apparatus for placing Unmounted Objects on Stage.

G. S. S.

Tunbridge Wells.

Telephonic communication has been established between Paris and Rheims, a distance of 172 kilometres. The ordinary telegraph-wire is utilised for the purpose. The tariff is one franc for five minutes' conversation.

NOTES ON THE COTTON FIBRE.

By Walter Henshall.

I.

STRICTLY speaking, cotton is not a fibre, though always known as "cotton fibre." It is in reality a vegetable hair, found covering the seeds of the cotton plant when mature, destined by nature to serve the purpose of the dispersion of the seeds, in the same way as the pappus of the dandelion and of the thistle: it has been adapted by man for the greater part of his clothing, and it will be seen how suitable it is for such a purpose.

The cotton plant belongs to the Nat. Ord. Malvaceæ, Genus Gossypium, and is cultivated in the tropical zone, and as far as 40° latitude. We have no representative of this genus in England, but in our common mallow we have a fair idea of what the cotton plant is like. The flowers of both are very similar, but in fruit a great difference is noticed. The seeds of the cotton plant, when ripe, are found to be enveloped in a mass of woolly hairs. These hairs or fibres vary in length as to the class of cotton, from three-quarters to about two inches. To give the reader an idea as to the minuteness of these fibres, it has been calculated that there are 140,000,000 individual filaments of American cotton in every pound.

The histology of the cotton plant has been strangely neglected by scientific men in the past, and it is only very recently that the subject has been studied. One consequence of this is the wide difference of opinion among botanists, as to the number and classification of the species and varieties of the genus Gossypium. Linnæus divided this genus into five species. Professor Parlatore, a gentleman who thoroughly studied the Botanical relations of the cotton plant, came to the conclusion that there were seven species. De Candolle reckoned thirteen species. Other competent botanists, however, consider that there are only four distinct species as below, all besides being merely sub-species or varieties.

Gossypium Barbadense produces the finest cotton we possess, viz. Sea Island, a long silky cotton. From the variety *hirsutum* we derive the North American and Egyptian cottons, which form the greatest portion of our supply. It is a shrubby plant, growing to the height of about six feet.

G. Peruvianum, as its name implies, is a native of Peru. It is indigenous to South America, and grows to the height of about ten to fifteen feet. The cotton derived from this species is generally harsh to the feel, like wool, and is known as Peruvian, Brazilian, &c.

G. herbaceum is the native cotton of India and the East. It is the smallest of the cotton plants, growing to the height of four to six feet. It produces the Surat cottons, which are short in staple.

G. arboreum is a tree-like shrub, growing to the height of fifteen to twenty feet. It is of little importance from a commercial point of view, as the supply is small. It grows in India and China.

Cotton fibre, when viewed under the microscope, has a twisted appearance, not unlike a joiner's auger, or a stick of barley-sugar. It is this twist in the fibre that enables us to make thread out of cotton. If cotton were cylindrical like flax, it could not possibly be spun into yarn, as the fibres would be too short, and would not hold together. But as the cotton fibre is twisted, it will be readily seen that in making yarn, the edges of the fibres will fit in each other. I cannot better illustrate this than in the case of rope-making. In making a rope, each strand must be separately twisted, and we know they will then fit into each other. And besides, these edges of the cotton fibre are corded,* and, as when the fibres are twisted together, they lock into each other. This explains why we can make strong yarn out of fibres so short.

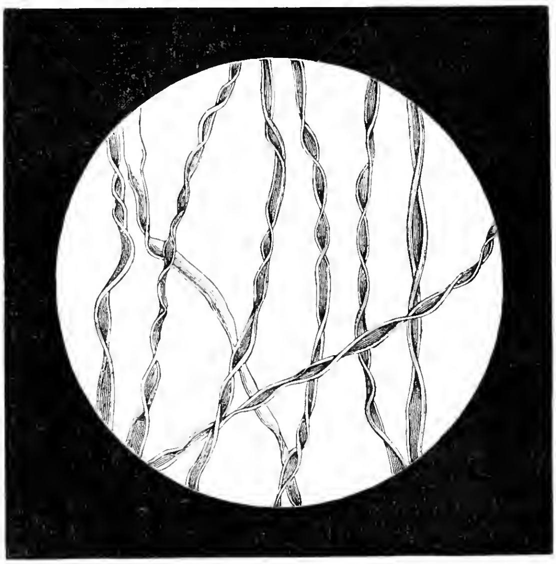

Fig. 5.—Fibres of American Cotton. × 225.

Cotton first appears as a downy covering on the seed shortly after fertilisation. Springing from the cellular tissue below the epidermis, they displace the cells of the epidermis and form a large cell, from which the outward growth of cells commences. Those of my readers who are botanists will understand the usual growth of a vegetable hair, but I must ask

* These corded edges can be seen with a high power, say ¼-in. obj.

them to remember that the cotton hair is one long cell, 1200–1500 times as long as broad. The method of growth is by the successive linear development of cells at the apex of the fibres, the cell-wall at the point of juncture being gradually absorbed until an exceedingly elongated cell is produced, which constitutes the cotton hair.

Whilst growth is progressing the fibre preserves a hollow cylinder, in which the vital fluids of the plant circulate, and so deposit material on the inner surface of the cell-walls. In this way the cell walls increase in thickness. When maturity comes, the sap is gradually withdrawn into the seeds, and a vacuum is formed, commencing at the apex of the fibre, at which point it begins to collapse, following the retreating fluid down to the base of the fibre. The consequence is that the apex of the cotton fibre is twisted upon its own axis a number of times. Thus it is we have the cotton hair, a twisted ribbon-like hair, with corded edges so admirably fitted for the purpose for which it has been adapted by man. These corded edges are caused simply by the binding of the cell walls upon themselves in the action of collapsing, and are found on every perfectly developed fibre.

I have made a number of observations to see whether these twists are regular in the same class of cotton, and also to find the average number of twists per inch. As to the former, I find that in ripe cotton the twists are regular, but there is so much cotton received in England that is unripe, or only half-ripe, that the number of twists vary much when taking an average of the bulk of the cotton. Below I give the number of twists per inch in several kinds of cotton:

Class.	No. of twists per inch.	Average. No.
Sea Islands	225–275	245
Orleans (America)	110–244	175
Egyptian	160–200	175
Broach (E. India)	90–210	144
Persian	90–165	120

It has been thought this twist was the result of cultivation, but it has been found in the wild cotton of Africa, though very irregular. Cultivation has, however, much improved the cotton fibre, both in length, strength, and regularity.

(*To be continued.*)

MIMULUS LUTEUS.—In August, 1884, I found this plant growing abundantly on the banks of the river Marau in Hertfordshire. The Marau is a stream which runs through Penshanger Park, and also forms Tewin Water, and in several spots between these two, the mimulus was flowering freely in large golden masses, together with mint, forget-me-not, &c.—*A. Warner, Hoddesdon, Herts.*

ENTOMOLOGICAL LITERATURE.

(MUFFET'S *THEATRUM INSECTORUM.*)

ONE day, some little time ago, as I was turning over a pile of old books on a street stall, I came upon a small Latin folio, of ancient appearance, containing a number of woodcuts of insects. It bore the following inscription on its title page, viz.:—"Insectorum sive Minimorum Animalium Theatrum. Olim ab Edvardo Wottono, Conrado Gesnero, Thomaque Pennio inchoatum. Tandem Tho. Moufeti Londinâtis opera sumptibusq. Maximis concinnatum, auctum, perfectum, etc. etc. Londini, 1634." I recognised the name of Muffet at once, and proceeded to strike a bargain with the vendor, the result of which was, that for a trifling sum, I became the owner of the interesting-looking volume. Arrived at home, I made a minute inspection of my purchase. It was, as above mentioned, a small folio in Latin, closely printed, and rather profusely illustrated wtth crude, but somewhat striking, woodcuts of the various species of insects, arranged pretty regularly, according to their different orders. It was printed in London in the reign of Charles I., A.D. 1634, just two centuries and a half ago. Subsequent investigations revealed the fact that I had come into the possession, not only of a copy of an early work on Entomology, but of a much more important production, and, indeed, the very first book ever published on all orders of insects as a separate volume. Although I call it the first important book on Entomology, it must not be supposed that there was nothing written about insects previously. The fact is, several works prior to this treated of them amongst other things, but were not devoted wholly to them; others, again, were published, wholly devoted to certain species, such as hive bees, silkworms, &c.; but this was the first book which treated of Entomology exclusively, and which also described all orders of insects. The unexpected acquisition of this interesting work induced me to devote some little time to "hunting up" the early literature of Entomology; and I now propose to give some notes, which I have collected on the subject, shewing its progress from the first notices we find of insects in any writings, till the science arrived at the dignity of a whole Latin folio to itself.

Entomology is, comparatively speaking, a young science, and was not esteemed of much consequence till, we may almost say, the commencement of the present century. Botany, no doubt, on account of its close connection with medicine; and mineralogy, linked as it was with chemistry (whose great theme was to find out the far-famed "philosopher's stone," which was to turn everything it touched into gold) were both studied all through the middle ages, while hardly anyone took any notice of Natural History,

including Entomology; consequently no books treating of insects are to be found. But as there is an exception to every rule, so we find some few men turning their attention to Nature, and even noticing insects briefly in their works, though their ideas were necessarily very vague, and many of their opinions exceedingly erroneous. We may even go back past the middle ages—past the Roman era—to that great age of arts, sciences, and literature—the Grecian, to find the first notice of insects recorded. We cannot now tell who was the first man the world saw who condescended to observe and write about them; but this we do know, that Aristotle, who wrote more than three centuries before the Christian era, took a great deal of his information from previous observers, whose names have perished, but some of whose observations are included in Aristotle's works; therefore we must rest content to know that some naturalists did exist so far back in time, but we can only commence our list of names with Aristotle, the tutor of Alexander the Great, who was born in Greece, B.C. 384. This great philosopher and naturalist wrote, among many other works, a "History of Animals," in which he included all that was then known relative to the history of insects. He is reported to have written this book at the express desire of Alexander the Great, who encouraged and supported him in a truly royal manner; for he not only supplied him with money for the undertaking to the amount of 800 talents, but in his Asiatic expedition employed above 1,000 men to collect animals, which were carefully transmitted to the philosopher!

Aristotle, in his "History," describes the habits of those species of insects most generally known; among Lepidoptera he notices the various kinds of *Tineæ*, feeding on wool, fur, books, &c., and one on honeycomb—no doubt *Galleria cerella*; and he also relates how butterflies are produced from caterpillars. Among the Hymenoptera he gives the mode of life and economy of the honey bee, the wild bee, the humble bee, the wasp, the hornet, and the ant; other species he describes are the grasshopper and the locust. Aristotle does not in his work draw up in a tabular form any classification of insects, but from his writings we are enabled to gather that he divided them by what is called the wing system, making two primary divisions, the winged and the wingless, and subdividing the former into six, and the latter into two families. From all this it will be seen that Aristotle, without doubt, paid some attention to the insect world; and though he did certainly entertain some very curious ideas on the subject, he was not so ignorant of the truth as is generally supposed. We often come across Aristotle's theory of the generation of flies, set forth as a sample of his entomological knowledge. He says, "Flies spring from dead animals of their own accord"—a popular error even at the present day, though more than 2,100 years have passed away since Aristotle wrote it; and further that "the flies inherit the nature of the animals from which they spring;" thus a lion will produce fierce flies which will attack and sting, while inoffensive flies spring from domesticated and peacefully inclined animals! But this is not at all a fair example to quote, after the list of insects I have given above, whose life histories he sketches fairly correctly; and I think that Aristotle's entomological knowledge has been greatly maligned.

Passing from the Greeks to the Romans, the name of Pliny the Elder figures as the great naturalist historian. He was a very ardent student of Nature, and wrote several books on the subject, one of which (No. 11) is divided into 23 articles devoted to insects, which however treat chiefly of bees; these he holds as his fixed opinion spring from certain flowers. Pliny met with his death during the eruption of Mount Vesuvius which destroyed Pompeii, A.D. 79.

Virgil, the great Latin elegiac poet, also wrote of bees, devoting the whole of the fourth book of the Georgics to their economy. Concerning their origin he says:

> "From herbs and fragrant flowers
> They cull their young."

—an idea far more poetical than correct.

Beyond these two writers, with the exception perhaps of Columella, who is supposed to have lived in the first century, and who in his work on Agriculture devoted some attention to bees, no further notice was taken of insects during the Roman era. After the decline of the Roman empire all literature fell to a low ebb in Europe, and excepting by Ælian, Natural Science was unnoticed and unthought of for a long period. Ælian, a doctor, was born in Greece in the twelfth century, and wrote a "Natural History of Animals," in twenty-seven books, containing a short account of insects, which however, did not put forth anything new, merely quoting the opinions of Aristotle and Pliny. Thus we may leap over a very long period, extending from the first to the fifteenth century—1500 years—without finding anything added to the history of Entomology.

WILLOUGHBY GARDNER.

(*To be continued.*)

THE town of Pittsburgh, Pennsylvania, makes large uses of natural gas. The wells are situated at distances from the town of about twenty miles or more, the amount supplied for use is 25,000,000 cubic feet per day, and an enlarged supply is being arranged for. It further appears from an article on the subject in "Science" that all great gas-wells are found on anticlinal axes, and that though it has a wide range through the geological column, natural gas is most abundant in the black slates of the Devonian.

HOW TO MAKE A CHEAP AQUARIUM.

As no doubt most, if not all, of my fellow readers are more or less interested in the keeping of an aquarium, and thinking that possibly a great many are deterred from owning one, on account of the cost (as a good aquarium is quite an expensive article), I forward complete and simple instructions for making a good and reliable aquarium, which I have made and found to answer each and every purpose served by the most expensive trade articles.

answer. I shall give the size that I have made, but this matter ought to be left to the readers, as one may want a large tank, while another may want a small one.

To make the bottom, we must have a sound, solid, and well-seasoned piece of black-walnut, let it be 34 inches in length, 18 inches in width, and 2 inches thick; this board should be nicely planed on the top, and then accurately squared, as shown at A and W. Then cut a hole one inch square in each corner, as at B. These should be one inch and a half deep, and

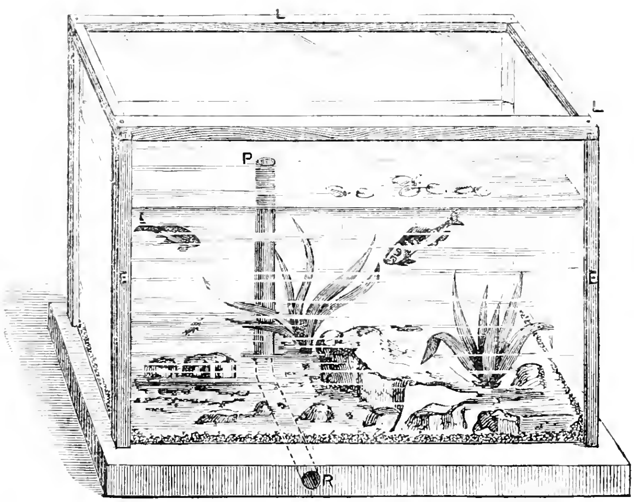

Fig. 6.—A Cheaply-constructed Aquarium.

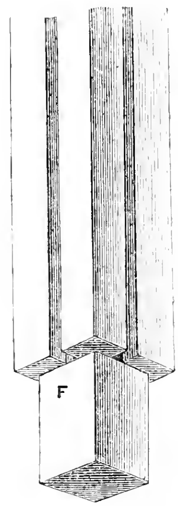

Fig. 8.—Posts of Aquarium.

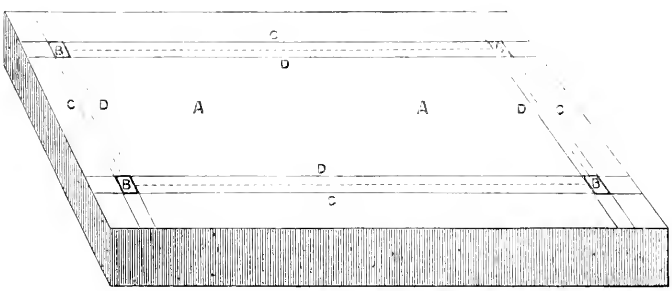

Fig. 7.—Bottom for Aquarium.

I must here admit that there are some points in the work which require some very delicate "tool handling," but as I myself am no carpenter nor joiner, it is no doubt possible that any young man, with a slight mechanical turn, can do likewise, and bring forth quite an excellent tank, if my directions are followed. In making the drawing (although no artist), I have used the utmost pains, so as to be very plain, and strictly reliable in every particular.

In making this aquarium, I found that the wood best suited for the purpose is well-seasoned black-walnut, although almost any well-seasoned wood will

be sure to have the sides of the holes absolutely perpendicular, so that the posts, F, will each be at right angles to the bottom, A. The one-inch chisel I have found to be the best tool for the purpose of cutting out the holes. In order to find the exact spots to cut out, make a set of lines one inch and a half from, and parallel with the four sides, as at CCCC, then make a second set parallel with the first set, but one inch from them, as at DDDD, and this will give the four squares, BBBB, which are to be cut out.

The next step is to cut grooves which are to hold the glass. Draw a line as denoted by the dotted lines in

the illustration, A; they are to be midway between the lines, CD; these grooves should be about one-eighth of an inch in width, and about one quarter of an inch in depth. Use a good sharp steel chisel, and cut these grooves in a perfectly straight line; after this is done we proceed to make the four posts, E.

These posts should be sixteen inches and a half long, and one inch and a half square, the end for the bottom must be cut to fit into the hole tightly, as at F. The best way to do this part of the work is to saw to the depth of one-quarter of an inch into the four sides of each post, at the right distance from nearest wood-turner, and have him turn off the end of each piece, leaving it one inch and a quarter thick, as at N, and then with a carpenter's brace, and a one and a quarter-inch bit, we can bore four circular holes, as in fig. 9, instead of cutting them square; this greatly simplifies the work, but it is not as strong as when the square holes are used. Get some good carpenter's glue, and, after putting some in the holes, while still hot, drive your posts well in with a wooden hammer, and fasten them through the bottom of the tank with a one and a half inch screw.

The pieces now being all in place, it will perhaps

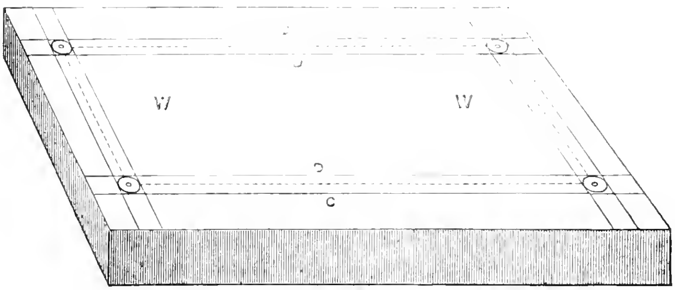

Fig. 9.—Bottom of Aquarium.

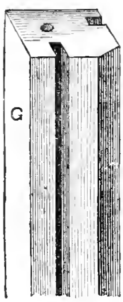

Fig. 10.—Details of Posts of Ditto.

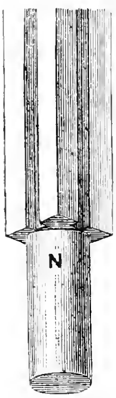

Fig. 11.—Ditto.

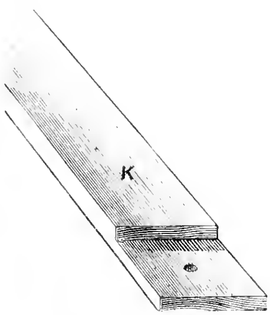

Fig. 12.—Details of Ditto.

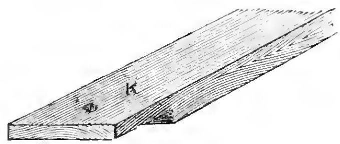

Fig. 13.—Ditto.

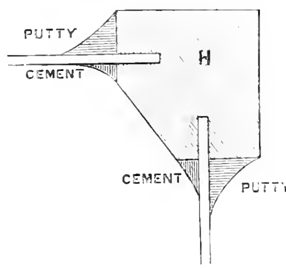

Fig. 14.—Method of Fastening Glass in Aquarium.

the end, and then cut three pieces off with the chisel, so that it will fit tightly in the holes. Then cut two grooves into each post, running the entire length, as at G, so that they will run directly into the grooves on the bottom board, when the posts are placed in their respective positions. The inside corners can now be planed off of each post, as at G; this will greatly improve the look of the tank, and you can then proceed to fasten each permanently into the bottom.

As the cutting of the posts is a very delicate, and, perhaps, the most difficult part of the whole work, it would perhaps be better for me to ask the less skilful of my fellow-readers to take their four posts to the be best to put them aside for about twelve hours, so as to let the glue thoroughly harden, and then the glass should be obtained. It will be very necessary to be careful in taking the measurements for the glass, so as to be a neat fit; neither too tight, as this would cause them to crack, nor too loose, as this would cause a leakage. When inserting the glass plates, carefully lower them into the grooves they are to occupy; then proceed to fasten the glass. In doing this, I here give a recipe for making a watertight cement, which I have used for two years and a half, which has never allowed one drop of water to escape, and my tank has never been repaired in all this time.

Take one and a half oz. boiled linseed oil, four

oz. of black tar, one oz. best tallow, and melt by a strong heat, then add to this mixture one lb. resin in small lumps, until the whole becomes a thoroughly liquid mass, and after filling the outside of the groove with putty, fill the inside of the groove with the hot cement, as at H. (fig. 14).

After the cement is thoroughly hardened, which may take two or three hours, we can proceed with the next step, which is to put a frame on the top of the tank, as at L.

Get two pieces of walnut thirty-one inches long, one inch and a half wide, and half an inch thick, and two pieces fifteen inches long, one inch and a half wide, and half an inch thick; proceed to cut the ends, as at K (fig. 12), so as to fit neatly and tightly together, and, after boring a hole through each end, fasten them with a one and a half-inch brass screw, to the top of the tank posts, and after cleaning away any superfluous cement which may have made its appearance, our aquarium is complete, and ought to present quite a neat and attractive appearance, if our work has been neatly done.

An iron pipe can also be introduced (covered with rubber), as at P (fig. 6), in order to keep the water at a certain level, and if it becomes necessary to add fresh water, the overflow can be caught with a basin at R. A cork should always be kept in this opening when not made use of, so as to keep the water from dripping on to the floor.

In stocking, and keeping this aquarium in a healthy condition, I can do no better than recommend my fellow-readers to consult that most excellent book "The Aquarium, its Inhabitants, Structure and Management (The Aquarium as a Nursery for the Microscope)," by J. E. Taylor, as a lengthy discourse upon this subject would here be out of place.

The outside of the tank can either be oiled with linseed oil, or else coated with some light-coloured paint which may beautify the appearance. For my part, I have always sponged the outside wood-work with good boiled linseed oil; this is all I ever found it necessary to do.

CHARLES VON EIFF, JUN.

New York City.

ASTRONOMY AND METEOROLOGY.

By JOHN BROWNING, F.R.A.S.

VENUS will be an evening star throughout the month, setting about 8 o'clock P.M. on the 1st, about 8.10 on the 21st, and 7.30 on the 31st.

Mercury will be a morning star, rising about 6.20 A.M. on the 1st, and at times varying between 6.18 A.M. and 7.8 A.M. on the 31st.

Mars will not rise until 10.15 P.M. at the beginning of the month, but will be up about a quarter of an hour earlier each week, rising on the la day about 8.30 P.M.

Jupiter will be late for observation this month, not rising on the 1st until after 11.30 P.M., but getting up earlier throughout the month, so that he will rise on the 31st soon after 9.30 P.M.

Saturn will set throughout the month between twenty minutes and two hours before sunrise.

The date of the appearance of the new star in Andromeda is now approximately known.

During the first week in August the Great Nebula was being carefully observed at the Brussels Observatory, and the star was not then visible, but it is said to have been seen by Mr. Isaac Ward on the 19th of August. On the 31st of August it was clearly seen by Dr. Hartwig of Dorpat, and Lord Crawford sent out a circular from Dun Echt announcing its visibility to the astronomical world on the 2nd of September. About three months, therefore, would seem to be the period which elapsed between its first appearance and its dwindling until it had become a 12th magnitude.

On the 7th of September it was measured with the wedge photometer, and was found to be of 8.25 magnitude, this was probably its maximum.

Two new comets have been discovered; one on the 1st of December, by Mr. Fabry, of the Paris Observatory, R.A., 9 hr. 47 min. 8 sec. N.P.D. 68° 57′ 35″; and the second, on the 3rd of December, by Mr. Barnard, R.A., 65° 29′ N.P.D. 85° 15′. Both are faint comets.

After the display of falling stars on the 27th of November Dr. Reneger, of Riel, was requested by Dr. Weiss, of Vienna, to look out for Biela's Comet in the neighbourhood of Theta Centauri.

At the time of writing, information has not reached me whether this search was successful. In my last article I omitted to mention that I am indebted to my esteemed friend W. G. Lettsom, Esq., F.R.G.S., for notices from the "Astronomische Nachrichten." This assistance is invaluable to me, as in whatever language the notices appear, Mr. Lettsom translates them with equal facility.

The meteor shower on the 27th of November was successfully observed in many places. At Greenwich the number of meteors which fell between 5 and 6 o'clock was from 30 to 40 a minute. At Oxford, Professor Pritchard reports that from 6 hrs. 34 mins. to 6 hrs. 39 mins. they fell at the rate of 50 a minute, and from 7 hrs. 14 mins. to 7 hrs. 19 mins. at the rate of 60 a minute. Mr. G. Symons saw 5 in about one second and a half, just before 7 o'clock, which appears to have been the richest time of the shower.

At Windsor, between 6.15 and 6.40, an immense number of meteors were seen to fall. At Newcastle-on-Tyne 500 were counted in an hour, and at Camden Square, North London, they were seen to fall at the rate of 5000 an hour.

The mean temperature of the first week in December was about 3 degrees above the average for 20 years, but in the second week a severe frost occurred which lasted several days, the thermometer falling at nights

to from 6° to 12° below freezing. Writing on the 12th, the barometer, which had on the 11th reached 30.60, is falling; the wind is in the S.W., and there is every symptom of the frost giving way.

In the fortnight from the 7th of November to the 21st, the rainfall was only between one and two-tenths of an inch, while in the fortnight from the 22nd of November to the 4th of December rain fell to the extent of $1\frac{1}{4}$ inches, which is about 126 tons to the acre.

The average mean temperature for London in January is 39° Fahrenheit, and it is the coldest month in the year. On the south-coast, between Portsmouth and Ramsgate, it is about 41°.

The average rainfall for London in January is about 2 inches, on the south-coast it is nearly 3 inches.

Mr. J. Rand Capron has just completed, in the "Meteorological Magazine," a valuable paper entitled "The Rain-Band Vindicated." The majority of persons who have obtained Rain-Band Spectroscopes, and who have taken the trouble persistently to use them, have found them of considerable value, but a large number taking only a look through them from time to time, without studying the matter, think them of little service. To all such persons Mr. Rand Capron's paper will be invaluable; once they have the proofs of good results placed before them so plainly and logically, they will certainly give further attention to the matter. Besides these, many persons who are slow to take up any new method of observation until its value is admitted, will be now induced to give the Rain-Band a trial.

I am indebted to Colonel Michael Foster Ward for an account of a most destructive storm which occurred at Partenkirchen, Bavaria, on the 15th of October. The writer says the storm occurred in the night; at daylight a strange scene presented itself. The valley was filled with people collecting the fragments of their chalets, many of which had been carried away bodily. The Government Carving School, a three-storied building, had been stripped of its iron roof, a large fragment of which was carried 300 yards away. . . . The Stangenwald, a wood, clothing the precipitous side of the Wachsenstein, was utterly destroyed—250,000 trees being blown down. This destruction was effected in about half-an-hour. It has been ascertained that a million large trees are down in this district alone.

THE Royal Society have conferred the Copley Gold Medal on Auguste Kekulé, of Bonn, for his researches in organic chemistry. Professors D. E. Hughes and E. Ray Lankester have both received Royal Medals, the former for his researches in electricity, and the latter for his labours in embryology and animal morphology.

INSTINCT OR REASON?

MUCH has been said of late on this subject, and any evidence on the part of animals or birds, proving, or assisting to prove, the carrying out of a pre-conceived idea, or of solving a somewhat intricate problem is of value in enabling us to form conclusions as to the extent to which animals or birds are able to approach man in this direction. Many of the clever tricks of dogs, cats, parrots, &c., appear to be performed in a mechanical, blind sort of way, especially when such tricks are the result of a more or less cruel course of training, but on the other hand, cases do often occur in which there appears to be a direct advantage in the "trick" performed, and the performance itself would require a certain amount, not only of reasoning, but of calculation on the part of the performer. As I am as yet undecided myself as to whether I consider reason or instinct prompts the apparently skilled operations of the lower orders of animals, the following observation is free from any biased exaggeration in favour of either; for once having decided upon a theory, there is often a tendency to mould one's observations in the direction and support of that theory.

I have a common grey parrot which does not show any marked proficiency in what is termed talking, but no doubt is, as the sailor remarked once, "A good 'un to think!" The first point in its character that really attracted my attention was this. One hot summer's day it was placed in its cage on the lawn, where it was enjoying itself after its kind, whilst I was engaged in washing some plants with a garden syringe. As soon as the parrot saw what was going on, it ruffled its feathers and whistled a series of rich mellow notes exactly like water dripping into a deep well. I certainly never heard so good a case of mimicking sounds, or rather improving them, for the music of a garden syringe is not particularly mellow. This sound was kept up with much excitement till I sprinkled the bird with water, which was much enjoyed. After this, whenever the syringe was brought out, the same volley of mellow notes was given, but never on any other occasion.

The next performance was more of an engineering character. The bird's seed tin was secured to the side of the cage, about half way up, by means of a splinter of wood outside the bars, and through a ring on the seed tin.

One day the parrot managed to pull out this piece of wood, when of course the tin fell to the floor of the cage. After tearing the wood to fibres, I saw the parrot regard the fallen tin with something very like calculation. It then descended from its perch, seized the tin in its beak, right side up by the way, clambered back to its perch and tried to hook the tin in its usual place. This of course could not be done, so after several unsuccessful attempts it shuffled over to the other side of the cage, and carefully placed

the seed tin on the top of its water tin, where it left this, apparently quite satisfied with what it had accomplished. This may be instinct, or it may be reason, but I watched the whole performance, unseen by the bird, and it appeared to be carried out as carefully as if executed by a man cognizant of the laws of gravitation.

EDWARD LOVETT.

Croydon.

OUR SCIENTIFIC DIRECTORY.

[It is our desire to bring out a Scientific Directory in the monthly pages of SCIENCE-GOSSIP, feeling certain that it would be very useful for our readers to know what scientific societies had been formed in their own neighbourhoods. We shall therefore feel very much obliged if Secretaries of any kind of Scientific Society, in any town or part of the country, will send us the full name and title of each Society, together with the names of the President and Hon. Secretary.]

THE Royal Society: President, Professor Stokes: Secretaries, Professor M. Foster and Lord Rayleigh; Foreign Secretary, Professor A. W. Williamson.

The Geographical Society: President, The Marquis of Lorne; Secretaries, Clement R. Markham & D. W. Freshfield; Foreign Secretary, Lord A. Russell.

The Royal Microscopical Society (founded 1839): President, Rev. Dr. Dallinger, F.R.S.; Secretaries, Frank Crisp, LL.D, and Professor F. Jeffrey Bell, M.A.

Linnean Society of London: President, Sir John Lubbock, Bart., F.R.S.; Secretaries, Messrs. B. D. Jackson, and W. Percy Sladen.

Geological Society of London: President, Professor T. G. Bonney, D.Sc.; Secretaries, Dr. W. T. Blanford, F.R.S.; Professor Judd, F.R.S.; Foreign Secretary, Warington W. Smyth, F.R.S.

Liverpool Science Students' Association: President, Mr. A. Norman Tate, F.I.C.; Hon Secretaries, Mr. W. H. Read and Miss Helen Fryer.

Hertfordshire Natural History Society: President, Dr. John Attfield, F.R.S., Hon. Secretaries, Messrs. R. B. Croft, F.L.S., and F. G. Lloyd.

SCIENCE-GOSSIP.

SIR JOSEPH HOOKER, F.R.S., has resigned the Directorship of the Kew Botanical Gardens, after holding the post for twenty years. His son-in-law, Professor Thistleton Dyer, succeeds him.

A NEW edition of Mr. H. B. Woodward's important work on the "Geology of England and Wales" is announced.

A PENSION of £300 per annum has been conferred on Professor Huxley from the Civil List Fund, on account of his distinguished services to science. This is as it should be.

WE are pleased to see that Mr. J. H. A. Jenner has republished his valuable "List of the Land and Freshwater Mollusca of East Sussex," from the Proceedings of the Eastbourne Natural History Society.

A CAPITAL paper on "Boulder Glaciation," by Hugh Miller, F.G.S., appears in the Transactions of the Tyneside Field Naturalists' Club; and one on "River-Terracing; its Methods and its Result," (by the same author), in the Proceedings of the Royal Physical Society.

IT is stated that the telephone system of Paris, almost entirely subterranean, numbered at the end of last April as many as three thousand eight hundred subscribers.

IT appears that the specimen of Archæopteryx in the British Museum, the first that was found, was purchased for £1000, and the second, more perfect, was sold to the Berlin Museum for £1000. Another specimen has just been found at Solenhofen.

THE discovery is announced of a tree, the *Butyrospermum Parkii*, which grows in abundance in dense forests in Central Africa, and which yields gutta-percha. Mr. Edward Heckel, the discoverer, is of opinion that the tree can be transplanted into the English and French colonies.

MR. L. UPCOTT GILL, the publisher, is bringing out in 7*d.* parts, a series of most useful and original works, among which those now in issue are on "Poultry," "Fancy Pigeons," "Book of The Goat," "British Cage Birds," &c.

WE draw special attention to Mr. Joseph Smith's paper (republished from the "Midland Naturalist"), on "Anthropology: Its Meaning and Aim."

IN Sir F. Abel's Address to the Society of Arts (published in "Nature"), there is a sharp satire on the way in which pseudo-philanthropists "attack the problem at all points" of explosions in coal-mines, by offering rewards of £500 for safety-lamps which can never be forthcoming, and so reaping a cheap and temporary notoriety thereby.

WE have received a copy of Dr. Ricketts' important paper on "Some Erratics in the Boulder Clay of Cheshire, and the Condition of Climate they Denote."

DR. CURRIER, of New York, has invented an apparatus by which the large class of deaf persons, who have some amount of latent hearing, can learn to speak with greater uniformity and exactness.

M. PLATEAU, a French zoologist, has shown that the palpi of insects are not essential to the recognition and seizure of food, as has hitherto been imagined. Beetles, cockroaches, &c., can be deprived of them, and still retain the power of identifying and masticating their food.

A VERY important practical paper appears in the Wisconsin State Horticultural Society's "Transactions" on "The Grape Rot," by Professor W. Trelease.

THE last number of the Liverpool Science Students' Association's "Proceedings," contains capital digests of the papers read, and altogether shows a healthy state of intellectual activity.

THE great object-glass for the Nice Observatory, made by Messieurs Henry, is completed. It is nearly thirty inches in diameter.

M. TROUVEL thinks that the recently developed bright star in Andromeda has no physical connexion with the Nebula.

WE are pleased to find that the much-required work on the "Rotifera," by Dr. Hudson and Mr. P. H. Gosse, F.R.S., will soon be ready. It will appear in six parts, with coloured illustrations.

THE seventy-fifth birthday of Professor Asa Gray, the distinguished American botanist, occurred on the 18th November, and it was appropriately celebrated by the botanists of America presenting him with an appropriately decorated and engraved silver vase. Bravo, American botanists!

MR. JOHN RYDER gives in "Science" for November 27th, a full account of his new system of oyster culture.

DR. TRELEASE has republished from the Studies from the Biological Laboratory of the John Hopkins University, his important paper (illustrated) on certain "Zooglœæ and Related Forms."

MICROSCOPY.

MOUNTING GIZZARDS.—I wish to obtain and mount a gizzard of the common house cricket. Would some correspondent kindly tell me the handiest method of preparation and mounting?—*W. L. Tall.*

STAINING WITH IODINE VAPOUR.—Many of the micro-fungi when mounted permanently in Canada balsam become so transparent as to be nearly invisible. If previously exposed to the action of iodine vapour, they assume, when mounted, a clear yellowish-brown colour by which their structure is beautifully defined.—*B. Piffard.*

LIVERPOOL MICROSCOPICAL SOCIETY.—At the ordinary monthly meeting on December the 4th, a paper on some of the most interesting forms of life obtained during the summer dredging expeditions, was read by Professor Herdman, D.Sc. &c. Amongst Cœlenterata some points in the structure and the life histories of the following forms were illustrated and explained:—*Hydractinia echinata*, *Syncoryne eximia*, *Garveia natans*, *Eudendrium ramosum*, *Tubularia indivisa*, *Alcyonium digitatum* and *Adamsia palliata.* The curious polyzoon, *Pedicellina cernua*, was then discussed, and after that a series of tubicolous annelides, showing various modifications of structure. Special attention was directed to *Sabellaria alveolata*, which forms large encrusting masses on the rocks at Hilbre Island. Various Tubibranch and Nudibranch Molluscs, including Aplysia, Pleurobranchus, the rare *Goniodoris castanea*, Eolis and Dendronotus, were then described. The lecture ended with an account of the blood vessels in the tunic of three genera of Ascidium found at Hilbre Island, viz. Clavelina, Ciona, and Ascidia. The process by which these vessels had become evolved so as to form an organ of respiration in the last-mentioned genus was briefly sketched.

COLE'S MICROSCOPICAL STUDIES.—We were delighted, on our return from Australia, to see the familiar and welcome yellow wrappers of "Studies in Microscopical Science," by Mr. A. C. Cole, F.R.M.S., and the beautiful slides accompanying them. The parts for November are four in number, and are as follows:—1st "Structure of Macrosporangia (Anthers) in Taxus," with a very artistic coloured plate, showing a vertical section of Ovule of Taxus; 2nd is a practical illustration of animal histology, represented by the Lung of the Frog; 3rd is devoted to Pathological Histology, and deals with Pleurisy, and this is accompanied by a beautiful plate showing the lung (Emphysema) × 18. 4th is a "Popular Microscopical Study," and treats on insectivorous and carnivorous plants. All four are illustrated by slides, mounted in Mr. Cole's best style: than which there can be no higher praise. The slide illustrating the last paper is one of the most instructive and beautifully got up of any we have hitherto seen.

THE ROYAL MICROSCOPICAL SOCIETY.—The "Journal" of the above society for December contains, besides the usual full and accurate "Summary of Current Researches," the following papers:—"On some New and Rare Desmids" (illustrated), by W. Barwell Turner; "Further Experiments on Feeding Insects with the Curved or 'Comma' Bacillus," by Dr. R. L. Maddox; "Improved Form of Stephens' Binocular Prism," by C. D. Ahrens; "The Limits of Resolution in the Microscope," by Frank Crisp, &c. One delightful feature (or rather, without intending a pun, set of features) are the portraits of former distinguished presidents of the society, such as Owen, Farre, Lindley, Bowerbank, Carpenter, Busk, Bill, Quekett, Lankester, Sorby, Parker, Slack, &c. That of Professor Owen in an exquisite likeness.

ON CERTAIN SO-CALLED PRODIGIES.—This is the title of a paper by C. F. Cox, in the "Journal of the

New York Microscopical Society," in which the author, after treating the subject from a historical and literary point of view, enumerates a good many examples, of which some are more directly connected with microscopy than others. The bleeding of statues, shields, &c., would probably be the growth of a red lichen or alga, as *Hæmatococcus sanguineus*, or *Palmella cruenta*; "showers of oil" might be due to the appearance of a gelatinous protophyte, as Nostoc, or one of the Palmellaceæ; while "showers of wool" turned out to be a product of the Coccus. Other examples are, "showers of milk" (suggested to be the "white rust" fungus on cabbage leaves, &c.), the spotting of bread, &c. with blood (*Palmella prodigiosa*; Trichobasis, "red-rust" or "corn-rust" on grain; Œcidium, Puccinia, and Uredo on leaves of shrubs and trees); and "red snow."

MICRO-PHOTOGRAPHY.—"The Journal of the New York Microscopical Society" contains a beautiful example of what can be done in the way of photographing microscopic objects. Three side views of *Triceratium Davyanum*, "direct reproductions, in printer's ink, of the negatives," each side of the triangle being about $2\frac{3}{4}$ inches long, are given on one plate; the three views corresponding to three focussings. No. 2 shows a level of $\frac{2}{10000}$ of an inch below No. 1, that of No. 3 being $\frac{4}{10000}$ of an inch below No. 2 The photographs were taken by P. H. Dudley, C.E., and the plate says "Artotype. E. Bierstadt, N.Y."

SHARPENING MICROTOME KNIVES.—In using an oil-stone the blade should be moved forward, edge foremost, care being taken not to raise the back of the knife from the stone, and also not to press the knife upon the stone, but to hold it lightly, the necessary friction being left to capillary attraction.

ZOOLOGY.

RUGBY SCHOOL NATURAL HISTORY SOCIETY.—The Report of this Society for 1884 shows a very healthy state of things. It is well got up, from a literary point of view, and the illustrations are good; those on "Our Bats" being especially vigorous. Mr. Bloxam has a paper on "Ancient British, &c. Remains found near Rugby" (illustrated); Mr. J. E. Kelsall one on "Some British Quadrupeds;" Mr. G. C. Richards on "British Spiders;" Mr. E. E. Austin one on "Trout and Trout fishing near Rugby," &c.

PRESERVATION OF THE EYESIGHT.—I have read with pleasure Mr. Browning's observations on print easy to read.* It may not be generally known that the subject engaged the attention of the late Charles Babbage. In the preface to his table of Logarithms, published in 1841, the whole subject is discussed in detail, and an account given of the various experiments tried with a view to determine the most visible and easily read combinations. Type, spacing, and colour were all considered; as to the latter, buff paper printed with black gave the best result. The tables are marvels of clear printing and good arrangement.—*W. T. Suffolk.*

* SCIENCE-GOSSIP, Dec. 1883, p. 266.

AMALIA GAGATES, DRAP.—My sister, Miss M. E. Williams, has sent me two very interesting varieties of this pretty slug from Stourport, in Worcestershire. One of these corresponds to Moquin-Tandon's *V. olivacea*, being deep grey-olive coloured, and is new to this country; the other is a new variety of a drab colour, with the shield lighter tinted than the back, and which I propose to call *V. rava*. From the same locality she has also sent me *Limax maximus*, var. *Johnstoni*, Moq., which has only been previously found in Gloucestershire. Lessona and Pollonera, in their recent monograph on the Italian Limacidæ, published in the memoirs of the "Reale Accademia delle Scienze di Torino" for 1882, have described two new varieties of *Amalia gagates*, Drap., and which may eventually turn out to be British, viz. var. *bedrigæ*, animal black with lateral blackish bands on the sole, and var. *benoiti*, animal black with a white keel.—*J. W. Williams, D.Sc.*

THE FIELD NATURALISTS' CLUB OF VICTORIA.—This Australian Society represents a numerous and enthusiastic body of ladies and gentlemen who are fond of out-door observation and study. Some excellent papers are read at their meetings, after which there is usually a conversazione. We lately attended one of these meetings, and the room was crowded. The Club has now started a magazine of its own, under the title of "The Victorian Naturalist," in which the best of the papers are published. Two of the last numbers contain the following:—"To Wilson's Promontory, Overland," by J. B. Gregory and A. H. Lucas; "A Trip to the Caves near Chudleigh, Tasmania," by F. Wisewould; "Notes on a Basalt-Vitrophyr," at Tanjil, by A. W. Howett; "Geological Structure of S. W. Victoria," by J. Dennant; "Additions to the Queensland Flora," by Dr. Lucas, &c.

THE HERTFORDSHIRE NATURAL HISTORY SOCIETY.—Parts 5 and 6 of the "Transactions" of this well-known Society are published. They contain, among much of other important matter, the following papers of note:—"The Origin and Composition of Chalk and Flint," by Professor T. Rupert Jones; "List of Works on the Geology of Hertfordshire," by John Hopkinson, F.G.S.; "Diatoms; their Nature and Habits," by Francis Ransom; "Notes on Birds observed during the year 1884,"

by J. E. Littleboy; "Report on Insects observed during 1884," by F. W. Silvester, &c.

Limnæa glutinosa.—In the August number, p. 178, it is stated that *Limnæa glutinosa* has been recorded as living on Barnes Common. Mr. E. H. Rowe, who recorded this locality in the Proceedings of the Lambeth Field Club, now informs me that it is incorrect, and arose in a misidentification. The only other Surrey record for this species (Battersea, Cooper) is also probably incorrect or relating to a now extinct colony.—*T. D. A. Cockerell.*

Helix nemoralis.—The following analysis of four days' collecting may be of some interest to your readers, besides showing co. Dublin to be rich in varieties of this species:—

Date. 1885.	Libellula Type.	Rubella Type.	Rubella Type.	Libellula 00000.	Rubella 00000.	Rubella 00300.	Libellula 02345.	Rubella 00345.	Rubella 00345.
May 6	..	..	..	2	2	2	2	2	..
June 7	3	3	1	4	4	..	..	3	2
July 5	4	4	..	1	2	..	..	1	..
Sep. 20	1	1	1	..	1	1	..	6	..
	8	8	2	7	9	3	2	12	2

Date. 1885.	Libellula 00345.	Libellula (123)(45).	Rubella (123)(45).	Rubella (123)(45).	Rubella (12)345.	Rubella (12)3(45).	Rubella 1(23)45.	Rubella 1(23)45.	
May 6	2	2	2	2	..	..	..	..	
June 7	5	4	4	..	4	4	..	4	
July 5	2	..	1	..	..	..	1	..	
Sep. 20	2	..	..	..	..	..	1	..	
	11	6	7	2	4	4	2	4	

Two other specimens, taken were, one bandless of a chocolate colour, the other (as described by S. C. Cockerell, to whom I sent it) "with very light red transparent bands (confluent)," both specimens being rather immature, in all 95 specimens made up of 19 varieties. The localities were Green Lanes, Dollymount, Killester Lane, Artane, and Tolka Bridge, co. Dublin. I intend working up some others. —*John R. Redding, Seville Place, Dublin.*

Abnormal Amœba.—A short time since I found an amœba of such extraordinary dimensions as to justify its being recorded. In length it was within a very small fraction of the fifth of an inch, breadth about the fifteenth. This is ten times larger than any mentioned in Leidy's monograph. As I managed to keep it alive for nearly a fortnight, I had ample opportunities of showing it to several scientists, who all agreed with me as to its being an undoubted amœba. To the naked eye it was visible as a milky, slowly moving mass. When first seen it was very full of diatoms and fragments of other algæ. Whilst I had it under observation I saw it subdivide. This was accomplished very quickly. Two protoplasmic currents being set up, caused a necklike constriction which rapidly grew narrower, until an actual division took place, when each piece moved off in opposite directions. The following is a brief description. Form generally ovoidal, sometimes palmate and radiate. Sarcode granular, dense, containing oil-like globules. Ectosarc rather strongly differentiated from endosarc. Pseudopodia broadly lobate. Movements slow, except when animal was touched by infusoria or other organisms, when sarcode moved very quickly, to point of contact. Did not detect contractile vesicle. I take it to be a very abnormal form of *Amœba proteus.*—*E. B. L. Brayley, Clifton.*

Abnormal Trout.—When putting a number of two months' old trout fry (*S. Fario*) into a reservoir near here, I noticed one with two perfectly formed heads joined by a web of skin just behind the gills, the bodies merging into one at the dorsal fin. The after part of the body is perfectly formed, and the fish

Fig. 15.—Abnormal Trout Fry, 2 months old. Side view.

Fig. 16.—Ditto. Upper view.

did not seem to have any difference of opinion as to the direction it was to take in swimming and appeared lively and well. It was brought away and put into a small tank, where it has since died and is now preserved in spirits. I am informed by the gamekeeper who hatched it that fry with two heads or two tails are not uncommon, but that he has never seen a yearling trout with two heads. I enclose a sketch showing side and upper views of the fish, from which it will be seen that one head is about half a head longer than the other.—*Thomas Winder, Sheffield.*

The Bottle-nose Whale (*Hyperoodon rostratus*).—Almost every autumn we hear, from short paragraphs in the newspapers, of specimens of this animal turning up on our shores, but very seldom do we hear of what becomes of them. Most frequently they are purchased by the oil refiner for the sake of the blubber, or they may fall into the hands of the farmer and be used for manure. A male of this species, twenty-one feet long, was stranded near Dunbar, on the morning of Thursday 5th inst., and I am glad to say has been purchased by Professor Turner, of the University of Edinburgh, and removed entire to a convenient place for examination and subsequent dissection by him. As yet comparatively little is known about the visceral anatomy of this interesting xiphioid, but regarding it we may now hope before long to be in possession of information

welcome to scientists and of the most reliable description. That this anatomist takes a great interest in cetalogy is evinced by his numerous papers on the cetacea and the fine series of articulated skeletons he is now forming in the new museum of the University, among which may be enumerated *Balænoptera Sibbaldii*, *B. borealis*, *B. rostratus*, *Balæna mysticetus*, *Hyperoodon rostratus* ♀, *Mesoplodon bidens*, *Glabrocephalus melas*, *G. macrorhynchus*, *Platanista Gangetica* ♂ ♀, &c.—*Is. Simpson, Edinburgh.*

BOTANY.

The Waratah (Australian Bush-flower).—I have a splendid specimen of the above which was picked about 150 miles from here. This flower was at one time very plentiful about Sydney, but by reason of building and ruthless destruction of the plants is now almost extinct there. A great outcry has been made lately about the wholesale and reckless gathering of this and other wild flowers, the plants being frequently torn up by the roots. The flower I have is as large as a saucer, and commences with a fringe of flat petals, from out of which rises a close mass of petals very much like an unexpanded honeysuckle flower, and these eventually open. The whole is a brilliant scarlet set in a bed of dark green foliage.—*E. C.*

Floral Varieties.—I should be glad to know if any of the following have been noticed by readers of Science-Gossip: *Erophila verna*, with purple petals, growing very strong; *Erophila verna*, with orbicular seed pods; *Geranium Robertianum*, with white blooms, otherwise like ordinary specimens, though all plants growing near had pure white petals; *Geranium molle*, with white blooms, larger than ordinary and with petals more deeply fid and constant, this being the second year of observation. Not a single purple specimen amongst either batch of seedlings. Last and most curious. While hunting for insects during the month of October, 1885, I found a leaf of *Cardamine pratensis* bearing on its under side several small plants; one with two or three fully developed leaves. I have not heard or read that plants of this order are reproductive from the leaves, or, perhaps, I should say, the venation of the leaves. Of course the preceding may have been mentioned before, but being only a recent subscriber to your valuable Gossip, I have not had the chance of knowing.—*John Taylor.*

Primroses and Cattle.—Dr. Spencer Thompson, in his "Wild Flowers: How to See and Gather Them," says, p. 174—I quote from the edition of 1860—about the common primrose (*Primula vulgaris*): "Pretty favourite as the primrose is, both its leaves and flowers are rejected by all grazing animals, pigs excepted." This is a curious point about which I would like to know more, and I hope your correspondents will favour your readers with their knowledge as to the facts. I want to know what cattle eat primroses. When I first read the sentence quoted from Dr. Spencer's volume, now more than twenty-five years ago, I made this note in the margin of my copy: "Sheep are, on the contrary, extremely partial to primroses." I then lived in a primrose and sheep country among the hills, six miles south of Ballymena, in the co. Antrim, where it was noticeable that no primroses were permitted to put forth leaves and flowers along the hedgerows and in the shadowy grass of those fields wherein they were pastured, while they abounded in the same places when under tillage. Such is my experience of sheep eating primroses, and I have since come to know that goats—animals that I am sorry to say abound in my present parish, Artmore, co. Armagh—have the same partiality for "the primrose stars." It would, moreover, be interesting to know how the cowslip (*Primula veris*) is treated by the same animals.—*H. W. Lett, M.A.*

Botanical Drying Paper.—We have received a beautiful specimen of demy botanical paper manufactured for Messrs. Spicer Bros., 19, New Bridge Street, London, by Mr. Josiah Rose, of Southport, and sold by Messrs. Spicer to the trade. This statement will be an answer to one of the many queries which frequently appear in our columns.

GEOLOGY, &c.

Fossil Insects.—Apropos of the note on fossil insects in Science-Gossip, the following letter dated 1836, from an old number of the "Edinburgh Journal of Natural History," may be of interest to your readers. It is as follows:—"I have in my possession the wing of a fly encrusted with calcareous spar, found last summer, about twenty-four feet from the surface, and near the bottom of a freestone rock twenty feet in thickness, at Fairy Bank, parish of Bothwell. It was discovered . . . in a spot from which a mass of stone weighing two tons had just been removed. The wing is rather larger than that of a dragon fly; it is of a golden colour, and beautifully membranous. It retains all the freshness of the natural wing, having undergone no petrifying process, and is set, as if by the art of the lapidary, in the spar." The letter, which I have considerably abbreviated, is signed "John Craig," and accompanied by a rough sketch.—*J. A. Wheldon, Burgess Hill, Sussex.*

Fossil Insects.—Mr. Herbert Goss, F.L.S., has recently published, in the "Proceedings of the Geologists' Association," another of his capital papers on

Fossil Insects Recently Discovered in the Silurian and Carboniferous Rocks. After dealing with the various fossil insects found in these formations, in various parts of the world, he treats upon the fossil scorpions and cockroaches found in the Silurian strata, and also on similar insects found in the Carboniferous rocks. Mr. Goss's paper contains copious bibliographical notices of memoirs in various languages treating on the fossil insects of the primary rocks.

On some Borings in Kent.—This is the simple title of a very important paper just read before the Geological Society by W. Whitaker, B.A., F.G.S., Assoc. Inst. C.E. Seven deep borings in the eastern part of Kent were described, all of them reaching to the Gault. The chief one is at Chatham Dockyard, where, after passing through the whole thickness of the chalk, the Gault was found to be 193 feet thick; whilst the Lower Greensand was only 41 feet, and was underlain by Oxford Clay, a formation not before known in Kent. These parts involve the thinning of the Lower Greensand from 200 feet at the outcrop a few miles to the south, and the entire loss of the whole of the Wealden Series, which, further south, exists in great force, the Weald Clay being 600 feet thick, or perhaps more, and the Hastings Beds 700 feet or more. Still further south, in the central part of the Wealden district, there are outcrops of the Purbeck Beds, whilst the Subwealden boring continues the series downwards. We have thus an addition to the beds wanting at Chatham of some 400 feet of Purbeck and Portlandian, of over 1100 feet of Kimmeridgian, and of nearly 500 feet of Corallian, &c. In a section of 32 miles, therefore (the distance between the Southwealden and the Chatham borings), we have a thinning of beds to the extent of over 3400 feet, or at the average rate of about 100 feet in a mile. This northerly thinning agrees with the facts that have been brought before us from other deep borings in and near London; but the Chatham boring is the first in the London Basin in which a Middle Jurassic formation has been found. The teaching of the deep borings, as a whole, is that north of the Thames older rocks rise up beneath the Cretaceous beds, whilst on the south newer rocks come in between the two. The question of the finding of the Coal-measures beneath parts of the London Basin seems to admit of a hopeful answer, whilst the lesson of the deep borings as regards water-supply is that there is small chance of getting water from the Lower Greensand at great depths underground.

More Curious Primroses.—Since mentioning some uncommon primroses found growing wild, we have found others, growing like the oxlip; one having eight flowers, one seven, one five, and the other, three.—*M. E. Thomson.*

NOTES AND QUERIES.

Silkworms.—My relative, Laurence G. J. Epps, lately called attention to having several times noticed two chrysalides in one cocoon. I can now add, that I have since met with three chrysalides in one cocoon, and a most curiously ill-shapen cocoon it was. As might have been expected, the worms have generally interfered with each others' spinning operations, with the result that the threads could not be continuously wound off. Instances have been met with by us, however, in which this has not been the case, when it would appear that the second worm was either more lazy or more acute than usual. A very interesting article on the whole subject of silk appeared in "Harper's New Monthly Magazine" for July last, entitled "A Silk Dress." Reference is there made to double cocoons being common, and the writer hints that laziness is sometimes a weakness of the silkworm's character. Is it possible, however, that the explanation can be that the silkworm is gregarious?—*Hahnemann Epps, Tulse Hill.*

More November Meteors.—Retaining a vivid impression of the magnificence of the sight of the celebrated star-shower of the night of the 13—14 November, 1866, which it was my privilege to see under most favourable circumstances, I have ever since been on the look out for its repetition. Once more the precise date came, and there was nothing unusual noticed in the heavens. I had quite ceased to think of it, when, on the evening of Friday, the 27th of November, 1885, my attention was suddenly attracted at 4.40 P.M.—Dublin time—to what at the first glance I took to be sheet lightning, but which a moment's notice showed me was a shower of meteors or shooting stars that far exceeded the great display of 1866. The weather on the 26th was stormy, with heavy showers from the south-east till nightfall, when the wind veered to the west and blew strongly till morning. The 27th was calm and dry overhead, with a good sunset, leading one to expect frost. There was no moon, and the sky was perfectly cloudless when I first observed the meteors in extraordinary numbers flashing across it, some faint and vanishing after a short course; others far brighter than Venus ever appears to be, and many of these latter leaving a trail of light behind them as if they were blazing. A countryman who was speaking to me next day about them, expressively described it when he said "you could not look at a star but it ran away." I and a member of my family, whom I called to behold the beautiful spectacle, tried to count the meteors, I say tried, for it was impossible to enumerate all,—and we made out their numbers to be more than seventy per minute, which is considerably above the total of the star-shower of nineteen years ago. I watched them interruptedly for one hour, during which time there was no diminution in their numbers or brilliancy. At 5.30 o'clock the sky became overcast, but even then, when all the stars were blotted out by the misty clouds, a great many of the meteors were visible as they sped hither and thither on their mysterious paths. They all appeared to proceed or diverge from a point situated a little below Cassiopeia's Chair; from that spot they radiated in all directions, and as the locality was in the north-east, and not too much overhead, it afforded the finest astronomical sight it has ever been my good fortune to witness. The occurrence opens up another question for our star students, as the 27th November is not one of the dates set down for the recurrence of star-showers. It looks as if the orbit of

the earth had cut across another part of the band of meteors which astronomers tell us it passes through each year, about the 13th November.—*H. W. Lett, M.A., Ardmore Glebe, Lurgan, Ireland.*

SHOOTING STARS.—On Nov. 27th, along the littoral a very brilliant sight was witnessed, from soon after sunset till about midnight, when the sky, which had been slightly obscured by a light haze, became quite overclouded, the stars seemed to fairly shower down; many of the visitors compared it to a display of sky-rockets, and one more curious than the others counted over forty-five in the space of a minute. The country people round here are very superstitious, and, from the unusual abundance of shooting stars, as compared with previous years, believe that some great evil is about to happen. The generally accredited event is a war in Europe: it only remains for us to wait and see if their prediction be true or no.—*J. R. M., Mentone.*

THE PRACTICAL NATURALISTS' SOCIETY.—This society has now been in existence for two years, and numbers nearly four hundred members in all parts of the British Isles, as well as a few in France, Germany, Switzerland, Canada, India, Australia, and other countries. The society is managed by a committee, who discuss their various matters of business by post, and all the members are postally connected. There is a postal reference library, a postal reference collection of natural history specimens, and a body of referees who name specimens and answer questions through the post. With the nominal subscription of sixpence per annum, the society has done some good work, and promises well for the future. The secretary, Mr. H. Snowden Ward, Ilkley, offers to send particulars of the society to anyone who encloses a penny stamp to him.

MIMULUS LUTEUS.—F.H. Arnold will be interested to know that I found the above-named plant this last summer well established at one end of Cofton reservoir in Worcestershire. A lady to whom I mentioned this told me that she knew of it growing somewhere —I forget the place—in Oxfordshire.—*K. D., Cofton.*

MIMULUS LUTEUS.—Mr. Arnold, staying last year in August at Tintagel (in Cornwall), came upon this plant flowering abundantly along the banks of a stream, which ran down a neighbouring valley to the little cove of Trebarwith. This is the only time I ever saw it growing wild.—*B. Tomlin.*

AJUGA REPTANS.—I saw, during the last summer, a large patch of some fifty or more spikes of the white variety of this flower in a damp field here.—*K. D., Cofton.*

FLY CATCHERS.—A. Kingston's anecdote of the fly catchers and the stuffed fox reminds me of what I think is at least as striking a verification of the old proverb, "Familiarity breeds contempt." A scarecrow, dressed up in an old coat and hat, was put in the garden of a relative of mine to frighten the birds. It may have been very effective with other birds, but a pair of redstarts took advantage of the snug opportunity offered them, and made their nest in the coat pocket.—*K. D., Cofton.*

INSTINCT (?) OF SPIDERS.—I have noticed some time ago a curious habit of a certain species of small spider. I say habit, because I believe it to be really a habit or instinct. Thus, I found in a gentleman's greenhouse, in certain crevices of the woodwork, nests of spiders containing numerous eggs. These nests were woven around "bunches" of small pupæ or chrysalids. Evidently pupæ of some small fly or ichneumon. Can it be that these pupæ or rather the imagos proceeding from them, were intended by the spider as food for her offspring? The question is, would the pupæ produce imagos simultaneously with the hatching of the spider's eggs. If so, I think the spider's object would be undoubtedly evident. On examining the pupæ I found them to be alive and healthy, and giving promise of attaining to maturity. If my surmise be correct, what a wonderful instinct is shown in this action of a spider, a little creature whom we look upon as devoid of all sense or reason! And yet God, in His great goodness, has not forgotten to provide even the little spider with that instinct which enables her thus to provide, as it were, so wisely for her helpless offspring. Unfortunately, I was not able to follow up my discovery, to see if my ideas were correct. However, some other of your readers may have noticed and further observed this matter. I shall be glad to hear their opinion of it. —*William Finch, Nottingham.*

CUCKOOS AND THEIR EGGS.—Is it the practice for the cuckoo to lay its egg on the ground and then carry it about in its mouth until it finds a suitable nest to place the egg?—*J. B. W.*

MICE AS BURGLARS.—Is it a common thing for field mice to frighten small birds away from their nests, when they have been sitting for some time, and then steal their eggs? I have to-day found two nests deserted and mice in possession. The one was that of a long-tailed tit, who had been sitting for some time, and whose nest was in a hedge in a field; the other, that of a robin on a bank in a wood. On going to visit my little friend the tit, I expected to find her a very busy, happy, little mother with a large family to provide for, instead of which I found a very different state of affairs. No little "mother-bird" was to be seen. There was a look of desertion about the home, as of burglars having been at work. I carefully put in two fingers to feel if the eggs were there all right. Out ran a small mouse, through a hole which he had made in the nest. My fingers came out somewhat hastily, not having expected to find the thief at work! All the eggs were gone, not even the remains of the shells being left! When I first saw the robin's nest, I took out one egg—leaving two or three—the one which I took had been pushed almost into the side of the nest, and I had a little difficulty in getting it out. The bird returned to the nest, for on going to-day to see how the little birds were going on, I found four or five eggs, but quite cold and deserted. I noticed that another egg was in the same curious position, so I examined it more carefully and found that it had been drawn halfway through a small round hole. Suspecting, from the neat way in which the hole was made, that a mouse had done it, I removed the nest and found that it was a mouse's hole, into which he had evidently been removing the eggs. The robin, no doubt, too indignant at such treatment to remain at his post, had deserted it. To show my deep sympathy for poor robin, I deprived Mr. Mouse of his expected feast! —*M. E. Thomson.*

SWALLOWS AND THEIR YOUNG.—The early autumn which came on us so suddenly last year seems to have had a bad effect on the morals of the swallows. A number of them, having nests under the eaves of a cottage in this parish, migrated, leaving their young ones (about twenty) behind them. Most of these, forced I suppose by hunger to leave the nest, fell

to the ground, and became a prey to the cat. One might have thought that the domestic instinct which leads the swallow to cater for its young, would have proved stronger than the tribal instinct of migration, but on reflection one sees that for the old birds to remain would involve the destruction of both old and young, and therefore the instinct to do so would be sure in time to be dominated by the instinct of migration, which, though it leads to the death of the young birds, preserves the lives of the parents. May not the swallows which White of Selborne saw in November have been deserted young ones just old enough to cater for themselves?—*R. S. Pattrick, Sellinge Vicarage, Hythe.*

LATE SWALLOWS.—It may interest some of your readers to know that some of the swallow tribe are still here, in Nottingham, having seen them twice a day since November 1st; the weather since then had been mostly wet and mild, but one night there was a very sharp frost, the roads in the morning being one sheet of ice, still the birds were flying about as early as 8 A.M. Twice I have seen a couple of sand-martins, known by their small size, lighter colour, and comparatively square tail; the others were the chimney swallows, mostly young birds, but a few were old ones, distinguished by their darker colour and their longer outer tail-feathers: they were here this morning, and seemed as vigorous as if it was the height of summer.—*L. Lee, Naturalist, Nottingham.*

SPLIT FEATHERS.—Some time back you may remember I sent you up a curious pigeon's feather split and forming two feathers. In my poultry-yard to-day I picked up the enclosed cock's feather, which almost beats the pigeon's as a curiosity—as you will see on examination. I thought you would like to see it.—*Windsor Hambrough.*

THE KNOT.—Mr. Heathcote's note on the knot (*Tringa canutus* not *cornutus*) in summer plumage, shot during the second week in August, near Preston, is interesting as a matter of migration, as well as of the seasonable change of plumage. I have in my own collection a knot in full summer plumage, shot on May 20th, 1866, but that a specimen in this state should have been killed in this country in the autumn is, as I have said, interesting, for the simple reason that it has been stated that the young birds are the first to return southwards in the autumn from their breeding quarters without the guiding of their parents, which are said to remain in their northern breeding haunts until they have moulted, after which they would of course come to us in their winter dress. The breeding-place of the knot had never been satisfactorily determined until the Arctic expedition of the Alert and Discovery in 1875-6, and then no eggs were found; indeed, I believe they are still unknown to science. Mr. Hart, the naturalist on board the Discovery, records the 31st of May as the date when knots were first seen in the Arctic regions, and their young newly hatched on the 11th and 12th of July. The question, however, which I wish to raise is, Do the young birds migrate southwards from their breeding haunts without an escort of some few old birds? The fact of a female in summer plumage having been taken in this country in the second week in August would appear rather as evidence against this theory, and it would seem that some few adults, perhaps those most backward in moulting, do accompany the young and moult after their arrival in this country or still farther south. This granted, it would appear not to be a matter of pure and simple instinct on the part of the young in finding their own way on a long journey which they had never travelled before. It is just possible that the specimen mentioned by Mr. Heathcote had not gone out of this country, and had not nested; but the fact of its being in summer or breeding plumage would lead to an opposite opinion. I should be glad to see the opinions of others on this subject expressed in SCIENCE-GOSSIP.—*William Jeffery, Ratham, Chichester.*

ABSENCE OF THE OPERCULUM.—Mr. Tomlin's remarks on the *T. lineatus* at Herm are very interesting. Dr. Jeffreys (B. C. vol. iv.) mentions a specimen of *Fusus gracilis* which had no operculum, and, as is well known, the operculum of the common whelk is not unfrequently double or treble.—*T. D. A. Cockerell.*

THE SHARD-BORNE BEETLE.—Can any reader tell me the name of the above beetle? Shakespeare mentions it in "Macbeth," and Collins in his beautiful "Ode to Evening."

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

G. A. WIDDOWS.—No exchange was enclosed in your envelope.

D. RICE.—You will find an account of the migration of our British Birds in Morris' "Ornithology." Also in Tristram's "Sahara," and Seebohm's "Siberia in Europe."

P. Q. Z.—The microscopic fungus on your thistle is the sweet smelling rust (*Trichobasis suaveolens*). See Cooke's "Microscopic Fungi," p. 99.

R. C. CHAYTOR.—You may reflect objects seen under the microscope by means of the camera lucida and sketch them. See articles on the Microscopic and Fine Art, &c., in vol. of SCIENCE-GOSSIP for 1882, where you will find full details of construction.

F. M.—It is not at all uncommon to find blackberry blossoms out in the middle of November, particularly if the weather has been fine.

KRANI.—You will find in SCIENCE-GOSSIP for 1868, p. 141 et seq., an account of the pink and yellow laburnum. The clusters of yellow flowers are a reversion of the species grafted on the pink kind to their original colour. The occurrence is not uncommon.

JOHN FRASER.—Get Rutley's "Study of Rocks," price 4*s.* 6*d.*, published by Longmans. You will there find full particulars for cutting, slicing, and polishing rock sections.

A. C. R. H.—We are not aware of any classes in existence as yet, for teaching geology by correspondence.

F. J. R.—Hewitson's "British Birds' Eggs" contains a beautifully coloured drawing of the eggs of each species. But the work is scarce and always fetches a high price. But it is the best work on the subject.

A. VERINDER.—Ammonites are found both in the upper chalk and the flint, but very rarely in the latter. Nodules of iron pyrites, having a radiated structure, are much commoner. They are often found weathered out of the chalk, and mistaken for meteorites. The nodules of iron pyrites decompose into oxide of iron or red rust.

B. HOBSON.—The Hon. Sec. of the Botanical Exchange Club is Mr. Charles Baily, F.L.S., Ashfield, College Road, Whalley Range, Manchester. Concerning the latest edition of the "London Catalogue" apply to Messrs. W. H. Allen & Co., Publishers, Waterloo Place.

A. G. W.—Will you kindly forward us (privately) the names and addresses of the persons who have used our Exchange columns for the purpose of obtaining specimens fraudulently? We have a "Black List," and shall feel obliged by any of our readers reporting to us evident frauds.

C. C.—(Somme, France). The "London Catalogue" is an authoritative list of all genuine British plants. It is published at 6*d.*, and may be had of Messrs. Allen & Co., Waterloo Place, London.

REV. D. M. C.—Many thanks for your coloured drawing of double mushroom. In SCIENCE-GOSSIP for 1865, you will find figured a triple mushroom. Double ones are not uncommon.

EXCHANGES.

I WISH to exchange named and localised American fossils, in good condition, for others from England. None but those who mean business need answer this advertisement.—A. G. Wetherly, Cincinnati, Ohio, U.S.A.

WANTED, foreign zoophytes, especially those from Australia, Tasmania, Africa, and the East; also diatomaceous earth from the same districts; good slides offered in exchange.—Racine, 15 Horton Lane, Bradford.

MEMBERS wanted for an "Evercirculator" to be devoted to Entomology. Address for particulars—T. F. Uttley, S.S.C., 17 Brazennose Street, Albert Square, Manchester.

COCOONS of the North American Promethea and Cecropia moths, in exchange for moths, butterflies, and cocoons. Papilio (swallow-tailed) butterflies especially wanted.—Jas. L. Mitchell, jun., Grand Hotel, Indianapolis, Indiana, U.S.A.

WANTED, a Ross's microscope, with all accessories, give details, in exchange for a large herbarium, containing about 7000 species, value £150.—J. Harbord Lewis, F.L.S., 145 Windsor Street, Liverpool.

OFFERED, a pair of tumbler and one barb pigeon, all good birds, in exchange for nine micro slides (miscellaneous).—R. H. Thomas, 28 Albert Road, Devonport.

CLEANED and prepared scales of pagaro, melletto, buga, and other Mediterranean fish, in exchange for well-mounted slides. List.—John R. Marten, Pharmacie Oddo, Mentone, France.

WANTED, "The Illustrated Science Monthly," vol. iii., in numbers. Will give good micro slides in exchange.—Rev. H. W. Lett, Ardmore Glebe, Lurgan.

WANTED, foreign stamps or fossils in exchange for fossils of the Drift from a bed 200 feet above the sea level. Can give six varieties.—J. S. Milne, King-Edward, Banff.

WANTED, a copy of Dr. Cooke's "Handbook of British Fungi," in good condition, exchange.—John Brown, 5 Byron Street, Sheildfield, Newcastle-on-Tyne.

WANTED, a small set of instruments for amateur dissecting purposes.—T. A. Leonard, 258 Woodboro' Road, Nottingham.

A GOOD exchange for following nests containing full sets of eggs: stonechat, wood warbler, great tit, rock pipit, cirl bunting, hawfinch, goldfinch.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

WANTED, pupæ, various species: offered, British lepidoptera.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

FOR exchange or otherwise, vols. iii., iv., v., vi. of "Boy's Own Paper," canaries, bullfinches, or guinea-pigs preferred.—W. S. Castle-Turner, 6 Dagnall Park Terrace, Selhurst, S.E.

FOR disposal, SCIENCE-GOSSIP, Nos. 145 to 214, 151, 158, 173, 174, 181, 184, 191, 201 missing. Wanted, nigger's wig and tambourine.—W. S. Castle-Turner, 6 Dagnall Park Terrace, Selhurst, S.E.

BOOK of 78 botanical plates, engraved on steel, mostly by Sturm. The plates contain illustrations and dissections of 589 fruits. Wanted, a series of micro slides illustrating Invertebrata.—E. Cosgrave, 24 Gardiner's Place, Dublin.

WANTED, skeleton of fish, frog, reptile, bird, and small mammal; also any vertebrate or invertebrate specimens that would be useful for teaching purposes. Will exchange collection of nearly 200 skulls (various).—E. Cosgrave, 24 Gardiner's Place, Dublin.

WANTED, contents of a micro aquarium and unmounted objects, in exchange for mounted objects, postage-stamp album with stamps, value 10*s.*, and a few numbers of SCIENCE-GOSSIP.—F. Beddow, Derby.

WANTED, SCIENCE-GOSSIP for 1884, and No. 242, 1885. Will give in exchange "The Journal of a Naturalist," Knapp, new, half morocco, good copy.—R. C. Chaytor, Scrafton Lodge, Middleham, Yorkshire.

WANTED, marine shells: Crania, Lepton, *Venus ovata*, *Tellina donacina*, Venerupis, *Chiton ruber*, *C. lævis*, *C. marmoreus*, Velutina, Acera, Pleurobranch, *Cardium fasciatum*, *Marginella*, *solecurtis*, &c. Many to offer in exchange.—C. D. S., Maplewell, Loughborough.

Claus. biplicata, *Ach. acicula*, *Pal. contecta*, *P. vivipara*, *B. Leachii*, *Odostomia plicata*, *O. rissoides*, *Rissoa semistriata*, and many others in exchange for small series of the commoner species from different localities, especially from Ireland or Wales.—S. C. Cockerell, 51 Woodstock Road, Bedford Park, Chiswick, W.

Helianthemum polifolium, *Silene conica*, *Lavatera arborea*, &c., offered in return for other specimens.—E. C. May, The Bartons, Dawlish.

L. C. 7th edition. Offered 40, 41, 58, 182, 196, 205, 2326, 315, 316, 350, 38?, 406, 455, 539, 668, 723, 773, 814, 832, 857, 931, 1036, 1040, 1043, 1056, 1072, 1090, 1125, 1270, 1384, 1411, 1473, 1589, 1590, 1591, 1596, 1597, 1665, desiderata numerous.—W. S. Harrison, 15 Park Place East, Sunderland.

WANTED, Loudon's "Arboretum" &c. Will exchange rare and old works on Botany and Gardening.—A. D. Webster, Llandegai, Bangor, N.W.

WILL exchange for other works on Botany, several parts of Maunde's "Botanic Garden," bound; Linnæus's "Flora Japonica;" "Flowering Plants and Ferns of Great Britain," by Anne Pratt, Vol. 1; Northern "British Botany" in 4 vols.; MacIntosh's "Practical Gardener," "A new Orchard and Garden," with the "Country Housewife's Garden for Herbs," and the "Husbandry of Bees," 1623, from the Library of Stewart of Allonton. In good condition and beautifully bound in calf.—A. D. Webster, Llandegai, Bangor.

WANTED, coins, medals, tokens, old china or ancient pottery, &c., in exchange for fossils, canaries, or foreign Stamps.—F. Stanley, 6 Clifton Gardens, Margate.

LINNÉ, "Systema Naturæ," 9 vols. clean and perfect. Exchange offers, requested.—G. A. Barker, 1 Northwold Road, Upper Clapton, E.

WANTED, axial crystals, selenite figures, plates, wedges, &c., for small polar tourmalines, micro, or lantern slides.—H. E. Freeman, 60 Plimsoll Road, Finsbury Park, N.

WANTED, Yarrel's "British Fishes," Westwood's "Sessile-eyed-Crustacea," Ray Society, and other good natural history works in exchange for a new copy of Brenchley's "Voyage of the Curaçoa," with 50 plates, mostly coloured, of insects, &c. (very scarce), and other books.—C. A. Grimes, Dover.

BOTTERILL'S adjustable zoophyte trough (new), twenty vars. of British mosses, and specimens of the Brayaham Beetle (*Anaplognathus Leachii*), exchange for other microscopic apparatus and material.—W. J. Abel, Busford Road, Nottingham.

WANTED, members for the Scientific Circulating Magazine Society, which offers the choice of three parcels of magazines for perusal every month.—T. F. Uttley, 17 Brazennose Street, Manchester.

GOOD exchange given in insect preparations for all kinds of English and foreign insects (in spirit), must be in good condition.—C. Collins, Bristol House, Harlesden, N.W.

A WELL-MADE cabinet with 576 insects, moths, and butterflies, all British, many local specimens. Cabinet, 4 feet high by 3 feet wide, 38 drawers, 18 by 16, slide bottoms, drawers covered with glass.—Robert Barker, 11 Townend Street, Groves, York.

THE last thirty parts of "Entomologist's Monthly Magazine," exchange for books or offers.—H. C. Quilter, 4 Cedar Road, Leicester.

WANTED, British or foreign land and freshwater and British marine shells. Offered, *P. fontinalis*, *Limax lævis*, *Testacella haliotidea*, *H. rupestris*, *V. antivertigo*, *B. perversa*, *Cl. biplicata*, *Coch. tridens*, &c.—F. G. Fenn, 20 Woodstock Road, Bedford Park, Chiswick, W.

FOR exchange: *Lasæa rubra*, *Venus exoleta*, *Otina otis*, *B. perversa*, *Trochus lineatus*, *Helix virgata* (vars.), *Trochus magus*, *Helix nemoralis* (several vars.), *Limnæa auricularia*, *Venus verrucosa*, *H. tuberculata*, &c.—B. Tomlin, 59 Liverpool Road, Chester.

BIRDS' NESTS, ENGLISH AND FOREIGN.—Advertiser wishes to correspond with any other collectors of above.—Geo. A. Widdas, Bond Street, Leeds.

MICRO-SLIDES, well mounted, vegetable sections, double stained, in exchange for other slides.—J. E. Nowers, 71, Branstone Road, Burton-on-Trent.

BOOKS, ETC., RECEIVED.

"Fourth Annual Report of U. S. Geol. Survey," 1882-83, (Washington: Government Printing Office.)—"On some Recently Discovered Insecta from Carboniferous and Silurian Rocks," by H. Goss, F.L.S.—"The Victorian Naturalist," Nos. 5 and 6, vol. ii.—"On Boulder-Glaciation," by Hugh Miller, F.G.S.—"River Terracing," by Hugh Miller, F.G.S.—"The Journal of Conchology."—"The Illustrated Science Monthly."—"The American Florist."—"The American Monthly Microscopical Journal."—"Cosmos."—"Science."—"The Amateur Photographer."—"Ben Brierley's Journal."—"The Rochdale Field Naturalists' Journal."—"Feuille des Jeunes Naturalistes."—"The Garner."—Animal World."—"The Naturalist."—"The Midland Naturalist."—"Journal of the Quekett Microscopical Club."—"The American Naturalist."—Cole's "Studies in Microscopical Science." &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT FROM:—T. A. L.—J. B.—E. G.—E. M.—J. H. L.—J. F.—C. D. S.—R. H. T.—J. R. M.—H. W. L.—L. M. B.—J. G. G.—A. G. S.—E. I.—A. H.—F. M—E. B. L. B.—W. S. C. T.—T. S. S.—J. M. D.—W. K. M.—T. D. A. C.—R. C. C.—E. C.—T. B.—G. C. R.—E. C.—A. B.—P. Q. L.—E. H.—W. M. C. O'N.—Dr. P. Q. K.—A. D. W.—F. S.—G. A. B.—J. R.—C. A. G.—H. E. F.—E. C. M.—S. C. C.—W. S. H.—W. T. C.—J. H. A. J.—W. J. A.—F. G. F.—J. T.—T. F. U.—D. M. C.—C. C.—G. A. W.—R. B.—S. H. D.—D. J. R.—H. E. Q.—Dr. J. W. W.—W. O.—B. M.—W. J.—H. W. L.—J. B.—B. T.—F. H. A.—G. A. W.—J. E. U.—D. B.—A. S. W.—M. M.—&c.

ON MOUNTING PATHOLOGICAL SPECIMENS.

By V. A. Latham, F.M.S.

MORBID specimens can be prepared in the same manner as normal tissues, by the ordinary processes which are well known to all. The subject will be treated under the following heads :—

(1.) Examination of specimens while fresh.

(2.) Hardening of same.

(3.) The making of sections.

(4.) Staining.

(5.) Preservation by mounting.

It may here be observed that specimens of morbid tissues require, as a rule, a shorter immersion in chromic acid solution than healthy tissues do. A very small degree of over-hardening speedily renders them useless.

(1.) Examination of fresh tissues.

Divide the tissue into very thin slices with a section knife (should it prove too friable, tease it out by means of mounted needles). Be careful to use a well-wetted knife, and make your slices rapidly, or they will be too jagged.

Now wash your fresh slices well in water (whenever water is used it is distilled in every case), and then immerse it in any normal fluid, such as a solution of chloride of sodium to the proportion of $\frac{3}{4}$ per cent. in water, i.e. $7\frac{1}{2}$ parts in 1000 parts aqua dest. by measure, or (1) aqueous humour taken from the anterior chamber of the eye of a newly killed ox. (2) Serous fluids, such as taken from the pericardial sac, or amniotic fluid. To either of these serous fluids iodine may be added to form iodised serum. It is prepared by adding 1 part tinct. of iodine to 100 parts of the serous fluid.

To each oz. of the fluid add a couple of drops of carbolic acid and filter. Its disadvantages are that it alters the tissues slightly, and stains them yellow.

Glycerine is frequently used in preference to the salt solution, and is specially applicable to the examination of membranous specimens which only need spreading on a wet glass slide, and then covering with the same. Portions of the renal, pulmonary, and hepatic organs are thus frequently examined. Also portions of tumours ; their friability, however, requiring them to be teased out with needles as suggested above. The same may be said of portions of the heart's muscular tissue.

(2.) Hardening :—There are several hardening agents in use, viz. :—

(α) Muller's fluid :—R. Potassium bichromate, 2 parts. Sodium Sulphate, 1 part. Aqua, 100 parts. Dissolve.

The tissue should be kept in this solution for from one to two weeks, then placed in common alcohol for two or three days, after which it is ready for making sections. It is a valuable fluid for maceration of tissues which are examined by teasing—as tumours, muscle, &c.

(β) Chromic acid $\frac{1}{6}$ per cent., 15 grs. to oz. Take of this 2 parts, and sp. vini meth. (methy. sp.) 1 part. Stir.

Allow at least 8 or 10 oz. for your specimen, and be very careful not to allow it to remain in the solution more than a week. Change the solution once or twice in this period ; be careful to cut the specimens in small pieces before immersion, and after hardening, let them steep 24 hours in alcohol before cutting specimens.

(γ) Bichromate of potash :—2 per cent. It is useful for blood-vessels, nerves, kidneys, ovary, and especially for brain and spinal cord. When using, leave the specimen for at least a fortnight in the solution, changing it every three or four days.

(δ) Alcohol is also of use for spleen, testis, and lymphatic glands. It is specially worthy of note, as being a necessary complement in many cases to induration by other agents (Muller's fluid, bichromate of potash, &c.), a couple of days' immersion in alcohol being frequently indispensable to completely secure

the indurations induced by them. Where mucous membranes and portions of the integument are to be indurated, chromic acid will be the most applicable of these reagents for bony structures, or ossified tissues, taking care to add to the solution 4 or 5 drops of muriatic acid to every 8 ounces.

Lastly, alcohol must be employed for the hardening of all tissues which have been injected.

(ε) Picric acid :—(Kleinenberg) for hardening soft sarcomata, myxomatous and embryonic tissues, mesentery, &c. Make as follows :—Saturated watery solution of picric acid, 100 parts. Strong sulphuric acid (H_2SO_4), 2 parts. Filter to remove yellow precipitate which is formed, and add distilled water, 300 parts. It hardens the above tissues in from 3 to 12 hours.

(3.) Cutting sections :—An inexpensive section knife can be made by grinding the upper side of a common razor blade into a concavity, and the under surface quite flat. You will have a simple but quite as effective an instrument for your purpose as can be devised. Of course a microtome is the best. I strongly recommend Cathcart's as a good and cheap instrument, but the razor can be made to answer your purpose quite well. Keep it well wetted with alcohol while using, and slice your sections off rapidly, and in one sweeping motion of the hand immerse each *at once* in alcohol. If the tissue is too small to hold in the hand, imbed in wax, paraffin, cellodin, &c.

(4.) Staining sections :—There are so many different stains, that it would be impossible here to enter into full details of each. Therefore I shall content myself with naming those I have found the most useful. Logwood, carmine, methylanilin violet, methylene blue, anilin blue-black for nerve cells, picro-carmine, and osmic acid.

Bismarck brown and iodine green for double-staining. I would recommend students to buy the stains ready-made, as they are much more certain in action, and save a large amount of time. For staining in picro-carmine, see pp. 275 and 276 of Vol. XX., Dec. 1884, of this paper. In staining in methylanilin violet, soak the sections in a watch-glass for about two or three minutes in a watery solution ; wash well for half an hour in water, and mount in glycerine, either pure or according to Cornil, slightly acidulated with acetic acid. Farrant's solution may also be used as a mounting medium. Do not use Canada balsam or dammar, as both clove oil and alcohol dissolve out the colour, and even the chloroform used as a solvent for dammar and balsam acts in a like manner on the stain.

Anilin blue-black can be made as follows :—Anilin blue black, 1 part. Water, 40 parts. Dissolve and add rectified spirit, 100 part. (Bevan Lewis.)

Staining, filter a few drops into a watch glass, and add 8 or 10 times as much alcohol to it. Soak from ½ to 3 minutes, and mount in C. balsam. If the staining is too deep, soak the sections for a time in a 2 per cent. solution of chloral hydrate. (Stirling.)

Bismarck brown ; sections must be stained slowly, and the water in which the staining fluid is suspended must contain about 10 per cent. of methylated spirit. Make a straw-coloured solution, and allow sections to remain in this for several days. Mount in C. balsam. Where used as a contrast stain, pour a few drops of the strong solution into a watch-glass, and allow the section to remain in this for about 10 minutes.

Methylene blue :—(*saturated* solution) dilute with about 5 times its volume of water, mount in glycerine or Farrant's solution.

On double and treble staining morbid growths :—Well-hardened sections of rodent ulcer and epithelioma may be stained by the picro-carmine and logwood process, others of same material with rosanilin and iodine green, and compare them.

Amyloid degeneration, hardened in chromic acid, stain with rosanilin hydrochloride and iodine green, or eosin and anilin blue, a 1 per cent. solution of safranine gives a good result, and so does methylanilin violet, and iodine. The specimens are then mounted as ordinary preparations. (For the more complete list of staining reagents, see "Postal Journal," July and October, 1885.)

Before ending this paper, I would strongly urge students to get up normal preparations well, before beginning morbid, or they will otherwise be completely at sea, if I may use the term.

Summary :—1st day. Small pieces placed in chromic acid mixture.

2nd day. Fluid, changed.

5th ,, ,, ,,

8th ,, ,, ,,

9th day. Spirit mixture, i.e. 1 part of water to 2 of methy. spirit.

10th day. Pure methylated spirit.

14th ,, Plain water.

15th ,, Mucilage.

16th ,, Section cut, stained, and mounted. (Gibbs.)

The following papers and books may be of use to students :—

(Coats.) Pathology. 32*s.*

(Gibbes.) Practical Histology, &c. 5*s.*

(Green.) Pathology. 12*s.* 6*d.*

(Cole.) Methods of Microscopical Research. 5*s.*
And Pathological Studies. 21*s.*

(Cornil and Rauvier.) Pathology. 25*s.*

(Woodhead.) Practical Pathology. 24s.

(Ziegler.) Pathology vols. i. ii. iii. 12*s.* 6*d.* each, and various Journals, especially the Royal Microscopical, Years, 1883, 1884, and 1885, and Quekett, &c. &c.

SIR F. J. O. EVANS, F.R.S., late Hydrographer to the Admiralty, has just died, in his 71st year.

NOTES ON NEW BOOKS.

AN INTRODUCTION TO PRACTICAL BACTERIOLOGY, by Edgar M. Crookshank, M.B. (London: H. K. Lewis). Our language is gradually enriched by the advent of new words and terms. It is impossible in the history of intellectual progress and research that it should be otherwise. "Bacteriology" does not sound either euphoniously or attractively. But it well expresses the large fund of real knowledge, gained by patient microscopical observation and research, which is now so largely influencing the medical treatment of most epidemic diseases. Two or three years ago, we published in our own columns the admirable series of papers (illustrated) by Mr. W. B. Grove, B.A., on the "Schizomycetes." That was the commencement of a systematic arrangement of the subject, and the articles were subsequently republished in a cheap and attractive form by Messrs. Chatto & Windus. Dr. Crookshank's work is altogether on different lines. He modestly calls it "An Introduction"—it is in reality "A Manual," and a first-rate and very valuable manual too. It is abundantly illustrated with coloured plates and wood engravings, both of which are highly necessary to a work of this kind. To young medical men (and old ones too, for the matter of that) who are desirous of familiarising themselves with all the methods and natural history of epidemiological research, the work is most valuable. Dr. Crookshank has followed the methods introduced by Professor Koch, and he has been assisted by some of the most eminent bacteriologists of the day, all of whose help he generously acknowledges. The work includes a description of the apparatus, material, and reagents employed in a bacteriological laboratory: Microscopical Examination of Bacteria in Liquids, in Cultivation in Solid Media and in Tissues; Preparation and Staining of Tissue Sections; Preparation of Nutrient Media and Methods of Cultivation; Experiments upon the Living Animal; Examination of Animals experimented upon, and the Methods of isolating Micro-Organisms from the Living and Dead Subject; History of our Knowledge of Bacteria; Classification of Genera and Species, &c. &c.

Topography and Natural History of Lofthouse, by George Roberts (Leeds: Printed for the Author). The author is a well-known writer in the pages of SCIENCE-GOSSIP, and these two volumes deal with the topography, folk-lore, antiquities, phenological phenomena, and natural history of the district he lives in. Reviewers are not always obliged to read the books through, submitted to their notice. Perhaps, as Dr. Maginn used to say, it is enough for many of them that they cut the pages and then smell at the paper-knife. But we have read both these volumes right through with much pleasure. They are redolent of the country and country life, animal and vegetable. Their somewhat miscellaneous contents remind us of White's "Selborne," which is awarding them as high praise as is possible. To Yorkshire people especially the work must be very welcome, whilst even to general readers it is eminently readable. The writer's style is plain and unadorned, and yet vigorous English—just such as an educated Yorkshireman would employ. Evidently the compilation of both volumes has been a labour of love, and we wish the work all the success that it deserves.

Light and Life, edited by Joseph John Kaim (London: Wyman & Sons). This is a nicely printed book which professes to give the "Secrets of Vegetable and Animal Development, detected and explained in strict conformity with known natural and chemical laws"! It is not necessary to eat the whole of a hogshead of sugar to tell what it is like, and so we give the following quotation of how the author has "detected and explained" the secrets of the organic world, as a sample. This secret is printed in italics, so that the author evidently thinks it is very important. "Without the agency of the sun, the consolidating process of vegetable structures would be impossible; and equally impossible would be the consolidation of animal structures; for without a sufficient supply of oxygen, liberated by the power of the sun from the sea, and distributed by moving currents of air throughout the globe, consolidation would be impossible, even if all other conditions were present in vegetable and human structures." Our readers will now fully understand the reason for the milk in the cocoanut!

STUDIES OF COMMON PLANTS.

No. IV.—THE GROUND IVY.

(*Nepeta glechoma*, Benth. *Glechoma hederacea*, L.)

By CHARLES F. W. T. WILLIAMS, B.A. Cantab.

THOSE of my readers who are unable to examine for themselves either *Arum maculatum* or *Nepeta glechoma*, must indeed live in a curious region.

It is useless putting on paper my own observations on this or that plant, if my idea in doing so is not followed up by my readers. This kind of study will be found so fascinating to the lover of practical botany, that he will, in a short time, wish to study in like manner for himself, and on his own account.

As you read or work among our plants, consider them as friends—living friends, and treat them as such—they will repay you a thousandfold, and teach you lessons both religious and scientific you little dreamt of before. Their voices are gentle; their form is lovely; and, better still, their conversation is such as can be listened to with respect, delight, and awe.

If, then, you start with such feelings as these, you

will find how pleasant are the paths along which you wander; how full of peace are all your hours thus spent.

Some people might consider it rather a leap from *Arum maculatum* to *Nepeta glechoma*, and, indeed, from one point of view at least, it is.

The idea will occur of their being types of pride and humility. The haughty stateliness and refined beauty of the spadix of *Arum maculatum*—Pride. The gentle, retiring lowliness of the, in reality, far more beautiful *Nepeta glechoma*—Humility.

The natural order, Labiatæ, to which this plant belongs, possesses several very striking features, which should give the botanical rambler little difficulty in determining plants of the order. *Nepeta glechoma* is a good lesson in itself, furnishing as it does many, if not all, of the distinctive features of the Labiatæ. As we pursue our study we shall see this in stem, leaves, and flower. Remember, first of all, that the plants of this order have no deleterious qualities.

Nepeta glechoma loves to dwell beneath a hedge, and retires in modesty, hidden as much as possible by anything that might afford a shelter. The plant is usually procumbent, but not always much so. As it roots from the under side of its stem (Fig. 17), some part of course lies on the ground. If on a bank, its procumbent nature is far more noticeable than when growing on level ground. The plant loves the warmth of the sun, and flourishes best on sunny banks that are not too dry.

The root fibres are very interesting when examined under the microscope, and with care the root cap might be made out. The minute root hairs are, too, of interest. A little carmine solution will greatly assist in bringing out the parts in this investigation.

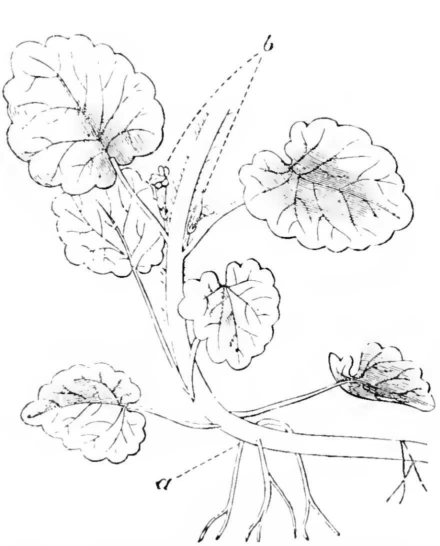

Fig. 17.—Lower portion of *Nepeta glechoma* (after Lindley). *a*, Roots produced from under side of stem; *b*, flowers of the Verticillaster.

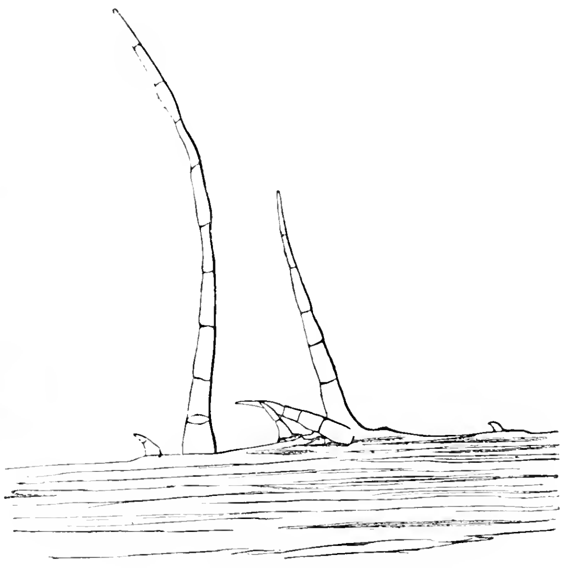

Fig. 18.—Multicellular hairs in various stages of growth from epidermis of stem (mag.).

On examining the stem, which is slender, its shape must be well noted, for here is the first characteristic of the order. The stem is tetragonal (Fig. 21), and covered with hairs; the whole plant is pubescent.

These hairs are generally very interesting, affording as they do good specimens of multicellular hairs (Fig. 18).

These should be mounted either separately, or with the epidermis of stem or leaf. The stem will be easiest to manipulate for the epidermis. It is best to mount in glycerine jelly. Sections should be taken both transverse and longitudinal through the stem, and arrangement of cells and vessels well noted. The petioles of the leaves are long; in many cases considerably longer than one would expect, being from one-half to two inches in length. The colouring matter in cells at the base of many of the hairs should be noted; these help to give various parts of the plant that purple tint which it assumes later on in the year.

The shape of the lamina is reniform, the upper ones somewhat cordate, deeply crenate green. Some difficulty will be found in obtaining the epidermis of the leaf, but it should be obtained. The stomata are few and small, chiefly on the under surface. The important point, however, is to note the oil receptacles (Fig. 20). These are the second important characteristic of most plants of the order. A leaf or two, if boiled for a short time in diluted nitric acid, will be found to separate its epidermis with freedom. A slide should be mounted showing these oil reservoirs.

The vessels making up the venation of the leaf may be easily dissected by the above process; and if

mounted in glycerine jelly will show the spiral vessels of which the bundles are composed.

The leaves are in pairs, opposite.

We now come to the third and very important characteristic of the order, that is, the inflorescence. This must be studied in *Nepeta glechoma* with great care, because, though the flowers are small, they are not so crowded as in many others; such, for example, as *Lamium album*, and therefore the peculiar inflorescence can be the better made out and understood.

On a careful examination of the petiole at its junction with the stem on each side, it will be seen that the flowers borne on very short pedicels spring from this axis (Fig. 19). In the case of *Nepeta glechoma*, in from two to three on each side. The general appearance of this manner of inflorescence is misleading. It leads one to assume it is that of a verticil. That is just what it is not.

Seeing that the flowers proceed from the axis of the petiole with the stem, the inflorescence is more cymose than anything else. But the flowers are nearly sessile, the pedicels being very short; therefore we get a distinctive name for this peculiar inflorescence, and we call it a *Verticillaster.*

So much for explanation; but if you want a short, clear definition of a verticillaster, here is one:—

Verticillaster, a false whorl, formed of two nearly sessile cymes placed in the axis of opposite leaves.*

If you turn to Asa Gray on Structural Botany, you will see that he, too, makes this matter very clear.

This is fortunate, seeing that many find it difficult to make out what a verticillaster really is.

The bracteoles which are subulate equal in length the short pedicels.

We now come to the consideration of the flower.

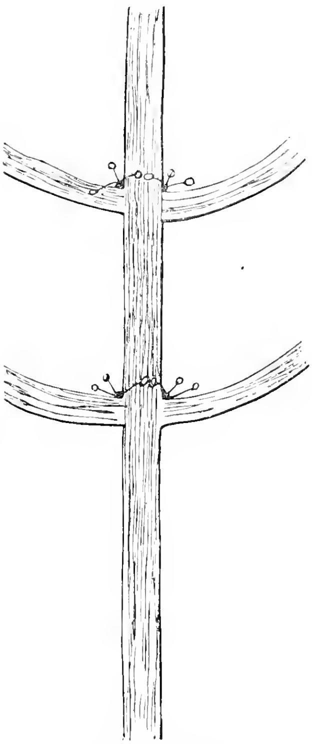

Fig. 19.—Rough diagram showing verticillaster inflorescence.

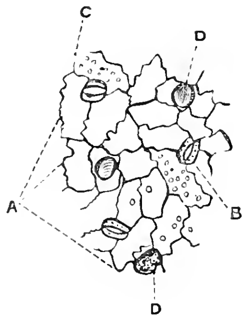

Fig. 20.—Epidermis from lamina of leaf (under surface). A, cells; B, stoma; C, chlorophyll bodies; D, oil reservoirs.

Fig. 21.—Tetragonal stem of *N. glechoma.*

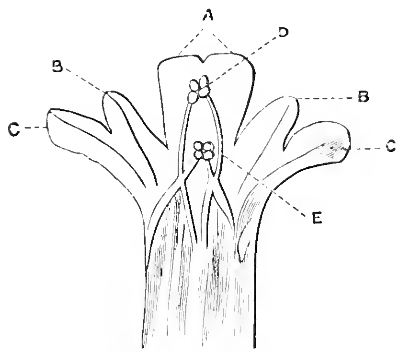

Fig. 22.—Flower of *N. glechoma*, cut open and folded back (much enlarged). A, Upper; C, divided under lip; B, lateral lobe of the corolla; D, E, anthers conniving and forming a cross.

Fig. 23.—Gynœcium of *N. glechoma.* A, bifid stigma; B, style; C, ovary; D, portion of calyx.

The calyx is tubular, persistent, and five-toothed; the teeth are recurved.

The persistent calyx is a fourth characteristic of the order; the fruit being enclosed in the calyx, as may be most commonly seen in such a plant as *Stachys sylvatica.* The corolla is bilabiate, which is a fifth and striking characteristic of the order. The corolla tube is long; the mid lobe of the lower lip obcordate. The upper lip is bifid, the lower trifid; the mid lobe large.

In looking down the corolla tube the picture is

* Balfour's "Class Book of Botany," p. 1102.

very beautiful. The colour of the corolla, azure blue, the tube spotted, and a fringe of white hairs at the base of the lower lip.

On examining the andrœcium, we find the stamens are four—two long and two short, or as we say, *didynamous*. This is a sixth characteristic of the order.

The stamens are epipetalous. The anthers connive and form a cross, as in Fig. 22.

The pollen grains are small, free from any markings, and of no special interest.

The gynœcium, which is shown in Fig. 23, consists of a deeply four-lobed ovary seated on a disk, the lobes each containing one erect ovule. The style basilar; the stigma bifid.

The fruit—nutlets, minutely granulate.

The seeds erect, exalbuminous.

Having followed out the study of *Nepeta glechoma* from roots to fruit, it may be well to recapitulate the points in which it shows the great characteristics of the natural order Labiatæ.

(α) Stem tetragonal.
(β) Leaves opposite, exstipulate, full of receptacles containing aromatic oil.
(γ) Inflorescence a Verticillaster.
(δ) Calyx tubular, persistent.
(ε) Corolla bilabiate.
(ξ) Andrœcium, 4, Didynamous, Epipetalous.
(η) Ovary, four-lobed.
(θ) Fruit, nutlets.

There is yet one other point of interest in *Nepeta glechoma*, and that is its micro-fungus.

Without saying that *Puccinia glechomalis* is as rarely to be found as *Æcidium ari*, still I think it is far from common. It is years since I found it, and then it was in a field some little distance from Cold Harbour Farm, Redland Green, Bristol—a spot well known to Clifton microscopists, especially for a pond replete with infusorial wonders, and abounding in *Hydra viridis*.

The following is Dr. M. C. Cooke's description in his "Microscopic Fungi":—

Puccinia glechomatis, DC. Ground Ivy Brand; spots brownish; sori subrotund, scattered, hypogenous; spores brown, rather short, sub-elliptic, scarcely at all constricted. On leaves of Ground Ivy, *Glechoma hederacea*. September and October. Not uncommon.

The Fungus will be found figured on plate iv., figs. 73, 74 of the above work.

Those who wish to refer to any old herbal will doubtless find many wonderful medicinal properties assigned to this plant.

Dr. Taylor mentions that in the North of England it "is credited with a fair share of medicinal properties."*

Sir J. D. Hooker speaks of the plant as bitter and aromatic, and that it was formerly used for beer, and occasionally for tea.

A tea made from the leaves of this plant is said to be good for colds, and is, I believe, often used by country folk. If you boil a few leaves in a test tube, the aromatic aroma given off will be found to be refreshing and pleasant.

Corns are by no means pleasant things to be troubled with, especially in long botanical rambles. Be it known, therefore, that if a leaf or two is steeped in vinegar for a few hours, and then placed on a troublesome corn, and bound round with a small piece of lint secured with cotton, immense relief will be experienced. Let the leaf remain on as long as possible, and if not eased, apply another.

I do not say this will cure a corn—what will? But this I do say, from personal knowledge in many cases, it will give relief, which is something.

Thus, then, I have, as far as possible, endeavoured to set forth the various points of interest in *Nepeta glechoma*.

* "Half Hours in Green Lanes," p. 230.

THE CAUSE OF TYPHOID FEVER.

Mr. W. W. Midgley, Curator of the Chadwick Museum, Bolton, recently read a paper before the Microscopical Society of that town on the "Bacilli of Typhoid Fever in Man." This paper contains such an important set of original observations that we extract the most valuable of them for the benefit of our readers.

Mr. Midgley said the experiments had been carried out under the joint observation of himself and Dr. Sergeant, Medical Officer of Health. In the early part of August several cases of typhoid fever were removed to the Borough Hospital. Some peculiarities in a case which ended fatally led Dr. Sergeant to make a careful investigation into it. In the second week of August he brought to the Museum, in order that the microscopic examination might be conducted conveniently, a test-tube containing some blood taken from the ventricle of the brain, as well as a portion of the brain of the patient. They examined a drop of the serum with Beck's 4-10-in. objective, and could just discern minute specks in motion. Then, applying a power of 1500 diameters, the nature and shape of the specks came out clearly. The bacilli were very numerous, flitting about the "field" with lively movements; some being dumb-bell shaped, and the two rounded ends, particularly of those where the constriction had become attenuated, struggling as if to disengage themselves from each other. Others were more rod-like in shape, some with one, others with two slight constrictions occurring along their sides. They also observed a few inactive specks, rather larger than the active types, auriculate in shape, somewhat opaque, the nature of which they could not at the time make out. Drs.

Rothwell and Howarth called in to observe the organisms. The next day they placed a fresh drop of the serum on the stage, and found the microbes far more numerous than previously. About two hours later Mr. Midgley noticed a change in one of the inactive, opaque specks already referred to, and shortly after the whole "field" was filled with fine dust-like granules. Half-an-hour later this had visibly begun to thin away, and upon careful illumination he could see the whole mass dancing about with the energies of vital force; and in a period of $3\frac{1}{2}$ hours from the time of observing the first change of the test bursting, the granules had become as active, and of the same shape, as the adult bacilli. He then concluded that the opaque specks noticed were encysted forms, and, having undergone segmentation, burst, and discharged their spores. They could readily see the binary fission going on in the rod-like forms, by the deepening of the constrictions, and, first assuming the dumb-bell shape, then separate, and become two distinct individuals. The serum was kept under cultivation for several days, and the alternation of generations watched from time to time. In order to see how the bacilli could be cultivated in milk, five drops were placed in a gill of new milk at 10 A.M. At 7 P.M. a drop of it was examined, and found to contain such a vast number moving among the fat cells of the milk as to keep the smallest cells in constant movement. The rapid rate of increase proved how enormous is their power for evil if the virus be introduced into the dairy. The next morning the milk had become slightly sour, and contained very few moving forms. By noon it had become white opaque, and was destroyed. Another of the experiments brought out how tenacious of life the microbes are. Three drops were placed in a small test-tube with about half an ounce of water, and held over a spirit lamp to boil for five minutes. The water was corked up while cool and examined, and to their astonishment they found them moving about the "field" as if nothing had happened. The introduction of alcohol or dilute sulphuric acid at once arrested their movements. In conclusion, he said that the presence of bacilli having been found in a region of the body so remote from the viscera as the brain, entirely disposed of the doubt honestly held by Klein, and he thought entirely settled the question, not only that Messrs. Klebs and Eberth were on the right track, but that typhoid fever is accompanied by these minute poisonous organisms. The great problem which science had to solve was, whether it was possible to modify the virulence of this noxious bacillus into the innoculo-septic form of *Bacillus subtilis*, as Büchner claims to have done with the *Bacillus anthrax* of splenic fever.

DR. SAMUEL BIRCH, Keeper of the Egyptian and Oriental antiquities in the British Museum, has died at the age of seventy-two.

TEMPORARY ENCYSTMENT AMONG INFUSORIA.

LAST summer I made an infusion of hay, which presently swarmed with Hypotrichous Infusoria, which were either of the genus Stylonychia, or some closely allied genus. I spent a good deal of time in watching their habits, which proved to be of great interest, and intended to determine the species more accurately later on. I failed to do so, however, because after a while a few of them began to form cysts (Fig. 24), covered with large strong projections; and the rest followed suit so rapidly that in forty-eight hours I had not a single free individual left. I shall in this paper call them Stylonychia; but it must be borne in mind that I am by no means certain that this is correct. None of them left their cysts before I had to go away from Devonshire. These strong spiny cysts are formed to protect them during a resting period. In what form they emerge from the cyst I cannot tell, but probably in their original form. I did not notice any particular abundance of conjugating individuals while the encystment was going on. Stylonychia Pustulata forms a cyst figured by Stein (Sav. Kent, pl. 45, fig. 16), which is very like those which I found, but differing in one respect. In *S. pustulata* the spines are generally united at their bases, whilst in those which I found the spines rarely touch each other, and are often separated by a space equal to half or more than half their height. These cysts seem to be simply protective, and are formed when the surrounding conditions are unfavourable, such as change of temperature, or the drying up of the ditch, or other water they are in. When thus encysted they are often blown about by the wind, and so, as all Infusoria-hunters know, turn up in places where they were not known before.

Amongst the Stylonychias were a large number of Tentaculiferous Infusoria, belonging to the genera Sphærophrya and Podophrya. These Infusoria have clubbed tentacles, through which they suck the juices of their prey. It is the relation between these and the Stylonychias which I have to describe.

Several of the Stylonychias were observed swimming about with a Sphærophrya attached. It was observations similar to this which led Stein to form his celebrated theory, that the young of many Infusoria were of the Acineta or Tentaculiferous type. Claparède and Lachmann, however, soon proved that the Acineta form was a parasite, and not the offspring; and Stein has since abandoned his theory. In one of these cases I observed a very singular fact —the Sphærophrya had its clubbed tentacles extended to their usual length; but it was also provided with a very large number of short tentacles, which were in constant slow, wavy, or vibratory motion (Fig. 25). They were much too thick to be called cilia, otherwise the case might be held to be parallel to the

one figured in Kent (pl. 46, figs. 4, 5), where Sphærophrya develops fine cilid preparatory to subdivision. These short tentacles were not clubbed. I observed another pair, in which the Sphærophrya was covered with these short curved tentacles; but these were all motionless. I cannot find in the books any trace of these short wavy tentacles.

My next observation was *Podophrya fixa*, which had seized one of the Stylonychias. The latter kept the cilia on the under side of its body in very rapid motion, as if endeavouring to escape. After I had watched it for more than an hour it got free and swam away. The next stage was as follows: a Stylonychia had a Sphærophrya attached; the former gradually contracted itself to a spherical form, with its cilia and again the Stylonychia made an attempt to leave its cyst, this time getting about one-third of its body out, and leaving its cyst behind with a thick uneven border (Fig. 28). Again it came in contact with the Sphærophrya, and then remained motionless for a long time, which closed my work for the night.

Another evening I observed a pair where the Stylonychia had assumed the spherical form, with its cilia projecting all round. These were withdrawn as usual. In falling down the tilted cell in which they were enclosed, the little one stuck somewhere, and the weight of the Stylonychia set it free. It immediately burst; a small quantity of protoplasm was emitted where the Sphærophrya had been attached, while two globular projections were thrown out on the opposite

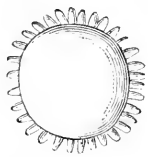

Fig. 24.—Normal cyst of Stylonychia sp.

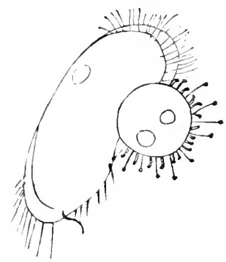

Fig. 25.—Sphærophrya, with short wavy tentacles, on Stylonychia.

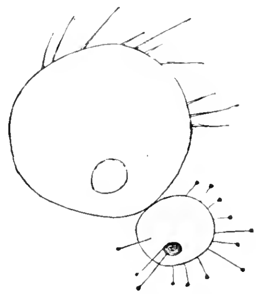

Fig. 26.—Stylonychia preparing to encyst when attacked by Sphærophrya.

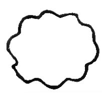

Fig. 27.—Remarkable shape temporarily assumed by Sphærophrya.

Fig. 28.—Stylonychia emerging from its cyst, a further stage of Fig. 26.

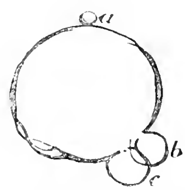

Fig. 29.—Stylonychia, which after withdrawal of the cilia has thrown out two large and one small globule of protoplasm.

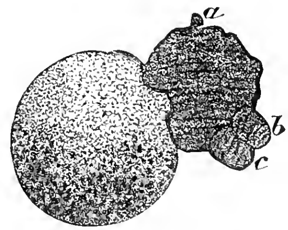

Fig. 30.—A further stage of Fig. 29. The internal protoplasm has left the cyst, now wrinkled and nearly opaque. Accumulation of granules at lower end of the oval body.

projecting all round (Fig. 26). After an hour all the cilia had vanished. It was forming a cyst, apparently to protect itself from its foe. It then threw out a blunt projection near the Sphærophrya, which burst, and a considerable amount of granular protoplasm was emitted. Then it resumed its contour. Again it burst close to the Sphærophrya, and again resumed its spherical contour. As the water on the slide was drying up I added a little water, which separated the pair a little way—the Sphærophrya assuming a very remarkable shape, with a wavy irregular outline, quite unlike anything I have seen in these creatures (Fig. 27). The Stylonychia then threw out another broad projection, which unluckily again brought it in contact with its enemy. I separated them again, side (*a* and *b*, Fig. 29). The cyst then opened in another place, and the whole contents of the body very slowly emerged; the process taking one and a half hours. The cyst formed over the two globular projections which I have already mentioned. In proportion as the interior part emerged, the cyst contracted in size, became wrinkled and opaque. The internal protoplasm emerged in a simple oval form, contained in a membrane so fine as to be barely visible. The protoplasm was finely granular, and every granule was in rapid swarming motion, something like the Brownian movements. The whole presented a very curious spectacle. Under the influence of gravity, these granules settled at the bottom of the oval, so that at last, this lower part

was nearly opaque, while the top part, owing to the fineness of the membrane, was barely visible. I could see no trace of nucleus or contractile vesicle. It remained in this state till I went to bed, and I did not see it again. I had so many Stylonychias at the time that I made sure of finding some more couples; but as I said before, they suddenly vanished away. This kind of encystment is quite new as far as I can make out. It is only temporary, and apparently is assumed expressly in order to get rid of the tentaculifera. For it is evident that the tentaculiferous enemy will remain outside the cyst while the Stylonychia gets away by another opening. The bursting and ejection of protoplasm may also be a means of defence, if it bursts just where the sphærophrya is holding on.

The form also in which the protoplasm emerges is quite new and strange. From its ordinary cyst, the Stylonychia emerges unchanged, whilst here we have a motionless oval body. What, again, is the meaning of the swarming motion of the granules, and what has become of the nucleus and contractile vesicle? I am painfully conscious of the incompleteness of these observations, but they seem to me to be of sufficient interest to be worth recording. When working at questions of this sort, one ought to be prepared to sit up all night if necessary; but unfortunately my health would not allow me to do that.

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GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

THE GEOLOGICAL RECORD.—Those who demand more and more of the "missing links" that are required to fill the blank spaces in the evolutionary series will find their wants very largely supplied in the Reports of the United States Geological Survey of the Territories. The multitude of new creatures, or new types or forms, there described is so great that palæontologists have heavy work before them in classifying the new finds. Such discoveries, properly regarded, teach us that, in spite of the great recent progress of geology, we yet know but a small fraction of the sum total of the number of species that have inhabited the earth during its past history. Even in the best-explored districts we can only find a few that have died under exceptional circumstances, or which, having hard shells or other exceptionally indestructible elements of structure, have been exceptionally preserved. Those that have shared the fate of the majority—have been eaten and digested—leave few or no traces behind; and those which have died on dry land, far away from the sea or lakes, must have decomposed or have been crumbled to dust ere they could reach the position of entombment.

I have again and again expressed heretical notions on this subject, and still maintain that when geologists represent a certain era as the age of fishes, crustacea, or the inhabitants of swamps and marshes, they perpetrate a serious fallacy; the fact that only such animals are represented by the fossils of the period does not prove that such creatures were any more representative of the period in question than they are now. The creatures that lived in the sea, and especially those in estuaries and near the mouths of rivers, became entombed in the deposits formed by the silt of such rivers, while of those on land only a few specimens that have been accidentally drowned under very exceptional circumstances could have been preserved. All the stratified rocks were formed in such places or on the sea-coast. Then again, how small a fraction of the whole surface of the earth have we yet scratched to any depth beyond soil-tillage!

COAL-DUST AND COLLIERY EXPLOSIONS. — Mr. W. Galloway, who has "done the State some service" in showing that neglected deposits of coal-dust are the great factors in producing *great* colliery explosions, complains, and I think justly (see "Nature," Dec. 31), of the manner in which Sir Frederick Abel, in an address to the Society of Arts, has recently slighted the merit of Galloway's work. I say "slighted" for want of a better word. It was not exactly ignored, not directly denied, not positively pooh-poohed, but all these modes of treatment were combined. Sir Frederick said, "Several well-known French mining engineers published, many years after Faraday and Lyell wrote, observations and experimental results as new which were simply confirmatory of those philosophers' original statements and conclusions; and, to some extent, this was also the case in still more recent publications in this country by Galloway and Freire-Marreco." That is to say, that a number of Frenchmen, many years ago, republished as new certain scientific work already old and done by Englishmen; and then later still, Galloway has claimed as his own these ancient and doubly appropriated researches. This is very hard upon Galloway, in spite of the qualification "to some extent." Being a regular contributor to the journal ("Iron") in which so many of his communications on the subject have appeared, I have read his papers, have become much interested in his work (which began in 1870), and have no hesitation in concluding that he is fully justified in all the statements contained in the letter above named, and in his complaints of the treatment he has received from Sir Frederick Abel. At the same time there is no evidence of ill-will nor intentional injustice, nor is any attributed to Sir Frederick by Mr. Galloway. It is simply a slighting due to imperfect knowledge of the subject. Galloway's researches show, that in great colliery explosions a relatively small quantity

of gas first explodes and raises a cloud of inflammable particles. These, heated by the flame of the gas, combine with the oxygen of the air suddenly and explosively, as in flour-mill explosions; more dust is thereby raised and exploded, and thus it travels like firing a train of gunpowder.

THE PREVENTION OF DANGEROUS COLLIERY EXPLOSIONS. — The above suggest very obvious practical lessons. Every colliery should be kept free from considerable accumulations of dust. In ordinary collieries, where there is much water, this may easily be done by a hose. In the collieries of the future, where we shall be working the deeper coal at depths only limited by the heat, the pits will be dry, and, as I have already explained (see "Limits of Coal Supply," in my "Science in Short Chapters"), surface water and intermediate springs will then be largely used for cooling purposes. These hot and dry workings will be especially exposed to terrible results from dust explosions, and therefore the necessity for a clear understanding and practical recognition of this source of danger becomes continually more and more urgent. Once understood, and thus recognised, prevention of serious calamities is easy enough.

My first underground experience was in descending a small trial shaft, and following a trial drift, under the guidance of a "larkish" young colliery engineer. When we arrived at the end of the drift he recognised a small blower, took a match from his pocket, and lighted it. A small but rather startling flash resulted, followed by a most alarming sense of suffocation. When above ground I remonstrated, and received reply that my conductor knew by the state of his lamp that there was no dangerous quantity of fire-damp, and therefore a good opportunity of giving me a taste was afforded. This "baptism of fire," though unpleasant, was very instructive, as it proved that an experienced collier can, by means of his lamp, form some estimate of the extent of danger; and, with the additional light thrown on the subject by Mr. Galloway's experiments, explains the fact, that explosions have in so many cases extended to roads and workings where no sane collier would have remained had it been charged with sufficient gas to be dangerous *alone*. If there is enough hydro-carbon gas to form with the air an explosive mixture, there is enough to fill the cage of the Davy lamp with the warning flame that is too terrible to be unheeded. The collier who would at once retreat and raise alarm on seeing this, now passes without heed any amount of accumulated coal-dust on pillars, walls, roofs, and dry floor of the pit, because he is ignorant of its dormant yet fatal energies.

PORPOISE MILK.—Mr. Purdie has published in the "Chemical News" an analysis of porpoise milk, which is very curious. To show its peculiarity, I state below the composition of the milk of some other animals, for comparison with that of the porpoise:—

—	Water.	Fat.	Sugar and soluble salts.	Nitrogenous compound and insoluble salts.
Woman .	88·6	2·6	4·9	3·9
Cow . .	87·4	4·0	5·0	3·6
Goat . .	82·0	4·5	4·5	9·0
Ass . . .	90·5	1·4	0·4	1·7
Sheep . .	85·6	4·5	4·2	5·7
Bitch . .	66·3	14·8	2·9	16·0

The porpoise milk examined by Mr. Purdie was yellow, thick, and had a fishy odour, and was composed of water 41·11; fat 45·80; albuminoids 11·19; sugar 1·33; and ash 0·57 per cent.

The curious difference is the very large proportion of fat: more than eleven times as much as in cow's milk, or nearly eighteen times as much as in woman's milk. It is probably connected with the demand for blubber by the young porpoise; and, if so, does not support the conclusions of those physiologists who have lately denied that the fat of food does not form the fat of the animal that eats it. It would be very interesting to compare the composition of the milk of an Esquimaux woman with that of a negress—the Arctic with the tropical variety of the same species.

DIGESTIBILITY OF CHEESE.—Klenze has experimented on eighteen kinds of cheese, and finds that Cheddar was digested in the shortest time (four hours). Unripe Swiss cheese required ten hours. He concludes that fat cheeses are dissolved more readily than hard skim-milk cheeses, because the fat renders them more open. He finds no connection between the digestibility and the percentage of water in the cheese, but that ripeness is favourable.

MANURING VINES WITH COPPER.—Many investigations have lately been made upon the absorption of soluble metallic salts by the rootlets of various plants, and the distribution of the metal in the plant. The vine has thus been manured with sulphate of copper, mixed with lime, by MM. Millardet and Gayon. They find that most of the copper is deposited in the leaf—that merely a doubtful trace can be found in the juice of the grape. Other experiments with other salts and other plants indicate that the chlorophyll of the leaves is the most addicted to picking up the foreign matter. Tea-leaves, for example, contain much iron, doubtless due to the ochreous soil on which they best grow. The analytical myth concerning the adulteration of tea with iron filings is thus explained. When roasted, the iron salt in the leaves is reduced to magnetic oxide, and the leaves are therefore attracted by a magnet.

THE KINETIC THEORY OF GASES.—Another blow has been delivered to this complex hypothesis. M. Faye infers that Hirn's recent experiments on the velocity of gases demand a reconsideration or absolute rejection of this kinetic theory. For my own part, I always regarded it as a violation of the fundamental principles of inductive philosophy. Atoms and molecules are first invented without any physical evidence of their existence, i.e. the discrete structure of fluids is assumed hypothetically. Then these imaginary separated entities are imagined to be in violent motion colliding with each other in such complex fashion that the mere description of their proceedings demands a serious amount of mathematics, or, if not absolutely demanded, it is certainly supplied. The structure of the imaginary molecules is made very complex. Thus Professor G. Forbes describes an "improved gyrostatic molecule," which consists of two fly-wheels on one axis with "the axis cut in two in the middle between them, and the parts fitted together by a ball-and-cylinder joint. The other ends of the half-axes are supported in ball-and-socket joints in the massless shell." The "crude molecule" thus improved was "a fly-wheel inside a massless shell," but this was too simple a conception of the constitution of matter—hence the improvement.

Such exquisite fooling, however suitable for the purpose of pedants, who by dint of mutual admiration are striving to set themselves apart as a mathematical priesthood, is not science at all; it is an obstruction perversely placed upon the path of scientific progress. Every natural truth is so simple that the teacher who himself understands it may render it intelligible to a little child; and whenever the explanation of a fact is more difficult to understand than the fact it pretends to explain, we may at once dismiss it as an illogical absurdity.

The true philosopher, i.e. he who has, first of all, studied himself, knows that he has no faculty whereby to enter and grasp the inner and absolute mechanism of matter; that he can only learn its action on himself by means of its relations to his senses and his reasoning powers. He knows that in the solution of physical problems he can only reason soundly on data supplied by the senses; and therefore when he reaches a problem to which his senses give no response he confesses his hopeless ignorance.

MIGRATION OF SQUIRRELS.—"Science" says that four millions of squirrels are emigrating from the Mississippi side over to the Arkansas shore at a point commencing about five miles below Memphis, and extending down for twenty miles. They are swimming the Mississippi river, and evidently making for more elevated grounds in Arkansas. Thousands are being killed by farmers, who, by reason of their great numbers, use sticks instead of guns. A similar emigration of squirrels occurred in 1872.

A NETTLE FUNGUS.

ONE of the most remarkable groups of the old genus Sphæria was that which was distinguished by its long, compressed ostiolum (mouth). This, which is the opening whereby the sporidia are enabled to escape from the interior of the perithecium, is in most cases a round pore-like aperture; but in the group which we are now considering, it is a narrow, linear chink, seated on the top of a kind of crest or ridge which runs across the perithecium, and is often as long as the perithecium itself (Fig. 31). The species possessing this character were formed by Persoon, in 1801, into a section called *Sphæriæ Platystomæ*,* and this name was afterwards adopted by Fries, in 1822; he then altered the name to Lophiostomæ, in 1849, and still later they were separated entirely from the true Sphæriæ, and constituted by De Notaris into a distinct genus called Lophiostoma.†

Now, again, this genus is raised to the rank of a family, the Lophiostomaceæ, by Saccardo, and the various species which are included under that name are subdivided into seven genera, to one of which the name Lophiostoma is restricted. According to the rule in such cases, the genus to which the restricted Lophiostoma is assigned, is that which includes the first known species of the group, viz. the *Sphæria macrostoma*‡ of Todè, who described and figured its external appearance with remarkable accuracy, so early as 1791. As a curiosity, his drawing is here reproduced (Fig. 32), from plate ix. of the "Fungi Mecklenburgenses Selecti."

We may pause here to notice the manner in which the species that at first constituted but a small section of a genus, were afterwards raised to the rank of a distinct genus, and are now formed into a family, itself consisting of several genera. This instance is but typical of a process which has gone on in every department of Biology ever since the first establishment of the Linnæan nomenclature; one might say, ever since the first classification of natural objects formed itself long, long ago, in the brains of our untutored forefathers. The process is merely the natural result of the increase in the number of known species, and of the investigation by the microscope of minuter, and still minuter, details. If families, genera, species, etc., represented in all cases something really existing, there might be some objection to such proceedings; what is rightly called a "genus" now, could not hereafter be rightly called a "family." But we know that these names are merely subjective, that is, represent things of man's own devising, and that the distinctions which appear to him so necessary, only arise from the limitations of his knowledge. In many cases species still appear to us distinctly marked off from all other species, and the same is true of genera in a greater degree; but

* Flat-mouthed. † Ridge-mouthed. ‡ Long-mouthed.

there are numberless instances where even genera are now united by gradual intermediate links, and of species this is true in an as yet hardly recognised profusion.

To a perfect being, having perfect knowledge of all the individual forms of organic nature that exist or ever have existed, the whole organisms of this globe would be varieties of but one species. And although for us, with the necessary finiteness of our faculties, species and genera must always remain, yet there will come a time when the discoveries of men will tend rather to diminish the number of "recognised" species, by discovering previously unknown links, than to increase them.

But to return to our subject. Among the species of Lophiostoma in the "Handbook of British Fungi," are two, *L. caulium*, and *L. sex-nucleata*, which have been found on the nettle. Of these the latter is now removed to another genus, Lophiotrema,* distinguished from true Lophiostoma by its colourless sporidia; and now appears in the sylloge, under No. 5432, as *Lophiotrema sex-nucleatum* (Cooke), Sacc. Besides these there is a species, *Lophiostoma dolabriforme*, with dark sporidia, which has been found on the nettle in France, and may be expected to occur here.

Last April I picked up an old nettle-stem, at Middleton, near Birmingham, which was in a very

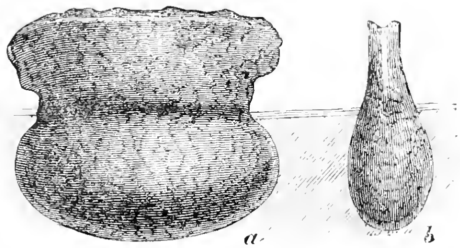


Fig. 31.—*Lophiotrema angustilabrum* (Sacc.). *a*, side view; *b*, end view. × 90.

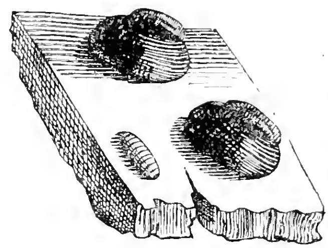


Fig. 32.—*Sphæria macrostoma*. (After Tode.)

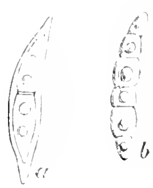


Fig. 33.—Sporidium of *Lophiotrema angustilabrum*. *b*, sporidium of *L. sex-nucleatum* (after Cooke).

Fig. 34.—Group of sporidia from a single perithecium of *L. angustilabrum*. *a*, a young sporidium; *b*, a mature one, showing pseudosepta; *c*, the most frequent form. × 1000.

Still, as matters stand, the increase must go on, and conjointly, for our own convenience, we must divide and subdivide our groupings more and more. Those who study the group of fungi which has developed out of the old genus Sphæria, know that Saccardo has pushed the process to a very great extent. In his stupendous Sylloge, nearly 6000 species are described which would have been included under Persoon's idea of Sphæria. It is obvious that such a mass of descriptions would be beyond the power of the ordinary human mind to compass, if the art of subdivision were not carefully employed to break it up into intelligible fragments, and those who grumble, as some in England do, at Saccardo's giant work, remind one of Mrs. Partington's futile efforts to conquer the Atlantic.

decayed and friable condition. On the lower part were the traces of many old and nearly vanished perithecia of *Leptosphæria doliolum*, but among them were a few, evidently quite fresh and vigorous, which a second glance showed to possess the unmistakable Lophiostoma crest (Fig. 31). These, on examination, proved to be identical with *Lophiotrema angustilabrum* † (B. and Br.) Sacc., according to the description with which they agreed in every respect but one. This species, the *Lophiostoma angustilabra* of the Handbook, p. 850, is said by the authors to have sporidia 40–43 μ long, whereas I find the length of the sporidia of my specimens to vary from 28 μ to

* Ridge-aperture. † Narrow-lipped.

33 μ, reaching occasionally 35 μ, but not exceeding that limit. But, fortunately, Plowright published specimens of this species in his "Sphæriacei Britannici," ii. No. 49. These I have not seen, but Winter has given the measurement of sporidia, from these specimens as 28–32 $\mu \times 7$ μ, thus agreeing exactly with mine.

We conclude, therefore, that the length of the sporidia, given by the original finders of the species, is too great. The difference may appear, to outsiders, very little; but it is found by experience that in the majority of cases, the size of the sporidia of sphæriaceous fungi is remarkably constant, and I have a reason for insisting on this point, as will appear from what follows.

My specimens were found on the nettle; *L. sex-nucleatum*, referred to above, also occurred on the nettle. Moreover, in Cooke's article on "Old Nettle-Stems and their Micro-fungi," the latter is stated to occur on stems "far advanced in decay," so as to be "tender and friable," as mine did. The chief difference between the alleged species is in the sporidia; those of *sex-nucleatum*, which are given as 35 μ long, are said to be shorter than those of *angustilabrum*, but the measurements quoted above dispose of this difference. Again, the sporidia of *sex-nucleatum* are, as the name implies, six-nucleate, each "nucleus" occupying a cell. By a "nucleus," here is meant an oily drop of much higher refractive index than the other cell contents. These objects, by-the-bye, are now called "guttulæ," since they have nothing in common with a true cell-nucleus. The sporidia of *angustilabrum*, on the contrary, are said to contain "two or three nuclei" in each half, and apparently have rarely been seen with more than a central septum, although said to be "probably 4–6-celled when mature."

Now, in Fig. 34, I have given a group of sporidia taken from a single perithecium of my specimens, and in Fig. 33, tracings from Cooke's drawings of the sporidia of the two species. By the comparison of these, it will be seen that the extreme forms of Fig. 33 are connected by intermediate links. When several guttulæ occur in a row, it is easy by manipulation of the light to produce a false appearance of septa between them, as at *b* (Fig. 34). This is a mere illusion of diffraction. I satisfied myself that none of the sporidia in my specimens were more than uniseptate. The earlier observers seem not to have been always on their guard against such illusions.

The sporidia of *angustilabrum* are further said to terminate in hyaline conical appendages at each end, which are wanting in *sex-nucleatum*. My specimens sometimes had, but oftener had not, these appendages. In Cooke's figure of the sporidia of *angustilabrum* in his article on "Lophiostoma," he represents a distinct enveloping membrane, of which I could see no trace. Winter also describes this; but Saccardo, who figures the sporidia of the same species in his "Fungi Italici," No. 238, says nothing of its existence. I conclude that this is not always present, which is very likely, for it is not in any case a membrane, but merely the outline of some mucilaginous matter surrounding the sporidium.

I think, therefore, that the last remnant of a difference disappears, and *L. sex-nucleatum* must be considered as merely a synonym, representing probably the most perfect state, of *L. angustilabrum.* This is what will, as I have previously hinted, befall many of the new species described in these days, as, indeed, it has done in the past. The true rule on this point I have laid down before. It is the duty of anyone who discovers a form of life which he cannot identify with any previously described, to give it a name, and append to the name a careful description; but it is *equally* his duty, when its identity with some previously known form is demonstrated by the discovery of facts which he was ignorant of, cheerfully to allow them to be united under one name, or to unite them so himself.

W. B. GROVE, B.A.

NOTES ON THE COTTON FIBRE.

By WALTER HENSHALL.

II.

HAVING described the general character of the cotton hair and its method of growth, we must now pass on to its structure and composition.

From treatment with various reagents, particularly an ammoniacal solution of oxide of copper, the cotton hair has been found to consist of four parts, quite distinct from each other: 1st, the outside membrane, which is insoluble in the copper liquid; 2nd, the cellulose, which occupies by far the greatest portion of the fibre, and round which there appears to be wrapped from end to end (3rd) spiral fibre; 4th, an insoluble matter occupying the core of the cotton hair, which resembles the shrivelled matter in the interior of quills. This solution (also known as Schweitzer's solution) has the power of dissolving cellulose, and it is most interesting to watch its action on the cotton fibre under the microscope. Before dissolving, the cellulose swells out enormously, dilating the outside membrane, and stretching out the spiral fibre, which is not so elastic as the outer membrane. This causes it to break in many places, the cellulose forming bead-like swellings where the spiral has broken away.

The action which other reagents have on cotton is also interesting. Caustic soda has a most peculiar effect on the fibre. When cotton is soaked in a solution of caustic soda, the fibres increase very much in diameter, and besides becoming fuller, the soda leaves them much stronger. It has also been found

that such fibres take the dye more readily, and when dyed the colour is more permanent. To make use of these important results, and further for the purpose of scouring all grease from the fibres, cotton is usually soaked in caustic soda before it is dyed. Sulphuric acid dissolves cellulose, membrane, and everything. Indeed, all acids, when in weak solution, render the cotton weak and brittle; some entirely destroy the fibre.

In the attempt to soak raw cotton in water, it will have been noticed how repulsive it is to water. This is caused by the outer membrane of the fibre, which is really vegetable wax, called by some, cotton wax. It is the same substance as the "bloom" found on some leaves and fruit, and is composed of the same constituents, and in nearly the same proportion as cerosine, a wax obtained from the leaves of the sugar-cane. In bleaching, this waxy covering is dissolved by the hot bleaching liquids, which also remove a fatty acid along with the wax. The loss in weight sustained by bleaching is generally about five per cent. so that if we were to have bleached 100 lbs. of grey calico, the weight after bleaching would be only 95 lbs. The cotton wax, however, only forms a small portion of this loss, as it only constitutes two per cent. of the whole of the fibre. We may describe it as a varnish on the cotton hair, which is impermeable and insoluble in the copper solution previously referred to.

The cellulose forms about 87 per cent. of the cotton hair. It is similar to that found in the cells of dicotyledonous plants and trees, and is deposited on the inner side of the cell-wall in layers. These layers, or concentric rings, may sometimes be seen in a cross-section of the hair, highly magnified, though the laminated form is somewhat difficult to make out. It shows us, however, that the depositing of cellulose is not regular and continuous, but thicker in some places than others—similar to the way in which the rings are formed in the trunk of a tree.

The existence of spiral fibre in the cotton hair, seems to be the source of its great strength. It has been found that a fibre of a good class of American cotton will resist a strain of 145 grains before it breaks. Now the maximum or theoretical strength of yarn would, of course, be the aggregate strength of the fibres which compose it. But it is found in practice that we cannot get anything near this strength out of yarn; in fact, the actual is but a fifth of the theoretical strength. The number of fibres in a cross-section varies as to the thickness of the yarn. In 32's* twist, made out of American cotton, there are about 140, and in 50's yarn, about ninety in a cross-section. Of course, not all these get twisted in the thread. Many hang out from it, and this explains the great loss of strength. Cannot some improvement be made? This is the question which is engaging the

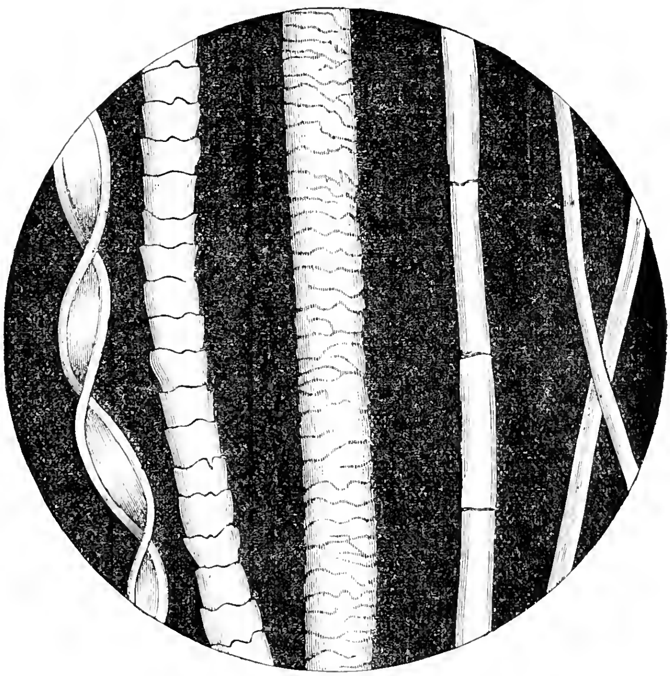


Fig. 35.—Cotton-Fibre, compared with wool, &c. × 400. (See page 39.)

* The numbers or counts are given to denote the thickness of the yarn. They indicate the number of hanks, each 840 yards, in 1 lb. of yarn.

attention of cotton spinners at the present time; and, indeed, now, one of the vital points with spinners is, who can make the most strong and even yarn out of the same cotton.

The cotton hair has a most wonderful power of absorption. This is most probably owing to the capillary attraction of the tube of the fibre. We see this property well adapted in lamp wicks, etc.; but it is often abused. Putting the yarn in a damp cellar, and steaming it in order to increase the weight, is one of the well-known tricks of the trade. It will be readily understood that cotton will absorb a great amount of moisture from our usual atmosphere. If we subject cotton that has been in an atmosphere of ordinary temperature to a heat of 212°, we should find it would lose about 7 per cent., through the evaporation of water, which loss would be regained if we replaced the cotton in the former temperature. Any manager of a cotton mill will tell you that cotton will lose weight even to as much as 5 per cent. on the change of from, say, very wet, damp weather to dry or frosty weather. Cotton, to be worked with ease, requires a humid atmosphere. In dry weather, the cotton seems to become less pliable, and so snaps and breaks. When very dry, it also becomes a good conductor of electricity, and is thus attracted to rollers, etc., through which it has to pass. These rollers lick up the cotton, and so make a great amount of waste.

In continuous dry weather the difficulties of spinning are often so serious that the floors of the mills are regularly degged with water to make the atmosphere moist.

In all classes of cotton, more or less, but more especially in the low classes of American and East Indian cotton, when received in Liverpool, there are found small patches of very bright straight fibres. These fibres are very weak and brittle, destitute of twist, and without any tube; and were formerly thought to be "dead cotton," by which name the fibres were known. With the aid of the microscope, some time ago, it was found that such cotton is really unripe*—cotton which has been gathered before the fibre was mature. As a consequence of this, little or no cellulose has been deposited, and the fibre is weak. When the vital fluid is withdrawn the cotton hair collapses entirely, and forms a flat, glassy, structureless fibre. Having no tube it cannot be dyed; being without twist it cannot be formed into thread. Altogether, it is a useless cotton, and not only useless, but very damaging when mixed with other cotton, as it usually is. And yet it is quite abundant in some classes of cotton. Machines have been invented to open unripe pods, and to extract the cotton and seeds: so we cannot expect any reduction in the quantity of this unripe fibre in future.

* One of these unripe fibres will be seen in the illustration in the January part of this Journal.

Cotton growers are always in a hurry to realise on their crops, and this is the result.

When cotton, having a great proportion of unripe or half-ripe fibre mixed with it, is spun into yarn, the short immature fibres, being broken up in the working, form little conglomerations of fibres in the yarn, or what are technically termed "neps." If such yarn, having been woven into cloth, were to be dyed, all these neps would be left untouched by the dye, and the cloth would present a speckled appearance, causing great loss to the manufacturer or dyer. From this it will be seen, how very important it is to see that the cotton we buy is free from this unripe fibre; and here is one of the many cases which point to the usefulness of the microscope in the cotton industry. I am glad to see that the textile industries are now taking more notice of the teachings of science, and I have not the slightest doubt that the microscope will be found increasingly useful in the future.

Before concluding, it would be well to compare the cotton fibre with other fibres and hairs of commerce. I would here refer to Fig. 35, p. 38. Taking from left to right, the first we come to is the regular form of the cotton hair. Next is Lincoln wool, then a common coarse wool. It will be noticed how the rough serrated surface of wool would act when made into yarn. I have previously mentioned that it is owing to the twist in the cotton fibre that we can make thread out of it. In wool the rough serratures act on each other, and enable them to hold together. If we were to try and make thread out of human hair, we should find it difficult, if not impossible, as human hair has a smooth surface and would not hold together. Remaining on the figure are flax and silk, both of which have a smooth glassy surface, but are of such length that the large number of twists in the yarn is sufficient to overcome the difficulty, and so the flax silk and thread holds together.

For information respecting the treatment of cotton fibre in manufacture, I would refer the reader to "Cotton-Spinning," by R. Marsden, published by Bell & Son. This volume contains full particulars of the machines through which cotton has to pass in the process of manufacture.

TRANSFER OF PICTURES.—I have been trying to transfer pictures to wood by means of methylated spirit, but have repeatedly failed. I placed the paper on a piece of polished wood, and then soaked the paper with the spirit by means of wadding. After leaving the paper on the board for twenty-four hours, I attempted to rub it off by wetting it, and rubbing it with my finger, and I have never been able to rub it off without tearing the picture. If any reader could inform me how to accomplish this task, either by this or some other method, I should be very thankful.—*Joseph Willson.*

THE HORNED HOOFED MAMMALS OF THE EOCENE PERIOD IN AMERICA.

(DINOCERATA.)

IN SCIENCE-GOSSIP for February 1881, I gave, under the heading of "Bird Studies in Chalk," a résumé of the contents of vol. i. of the "Trans. of the Peabody Museum of Yale College," in which Professor O. C. Marsh of Newhaven, Conn., detailed the history of the strange toothed birds (Odontornithes), discovered by him in 1872–5 in the cretaceous deposits of the eastern slopes of the Rocky Mountains.

Since the publication of that volume, the independent geological surveys and explorations of various states have been consolidated as the "Geological Survey of the United States Government," with Major J. W. Powell, as director, and the entire department of vertebrate palæontology, placed under the control of Professor O. C. Marsh, "palæontologist in charge." This accounts for the change of title and mode of publication of his second volume of contributions to knowledge of the extinct American vertebrate fauna, which has recently appeared as vol. x. of the "Memoirs of the United States Geological Survey." It forms a complete and fully illustrated history "of the dinocerata, an extinct order of gigantic mammals,"* of which the chief structural characters were made known as discovered from time to time in the "American Journal of Arts and Sciences," from the year 1871 and upwards. The present monograph is a well-printed and richly illustrated quarto with fifty-six finely executed lithographic plates, and over 190 original woodcuts separately illustrating every bone of the skeletons of both sexes, and various ages of these animals, and mainly drawn from the very large number of specimens obtained by Professor Marsh during different expeditions of the Yale College exploring parties in 1870, 1871, 1872, and following years. His collection at Newhaven now comprises more or less perfect parts of the skeletons, including seventy-five skulls, more than twenty nearly perfect, of at least 200 individuals of a horned race of large hoofed mammals that abounded by the swampy shores of a tropical and extensive lake basin in the middle Eocene period.

Professor Marsh describes this ancient lake basin as bounded then as now, west, by the Waksatch, south, by the Uintah Mountains, and on the north by the Wind river range, which furnished the sediments by which it was gradually filled up. It now lies at an elevation of from 6000 to 8000 feet above sea level in western Wyoming, and is drained by the Green River, main affluent of the mighty Colorado, which has carried away half of its former thickness of strata. For the Eocene deposits in this region are stated on good evidence to have once reached vertical mile in thickness. This estimate requires such an enormous lapse of time, both for deposition and partial erosion, as would amply suffice for the development and specialisation of the rich and varied fauna the area, 100 miles in extent, has already yielded to the hardy scientist explorers. Crocodiles, the ancestors of the modern bony pike, and fresh water dog-fishes, abounded in these waters, by which the ancestral forms of the present horse and tapir were refreshed, together with a vast number of flesh-eating, insect-feeding, and marsupial animals. Here dwelt the big-framed Tillodont, unlike all living mammals, with the ancestors of the little lemuroid monkey; and the huge horned dinocerata, half elephant, part rhinoceros, and part hippo, wallowed in the neighbouring swamps, or contended for mastery under the palms amid a tropical vegetation, sheltering insects, serpents and lizards.

The investigations of Professor Marsh prove, that the bulky horned animals he has called dinocerata (*deinos*, terrible, *keras*, horn), form a well-marked order, allied both to the odd-toed and even-toed divisions of the great group of hoofed mammals (ungulata), uniting in their structure features of the elephant rhinoceros, and suggestions of the hippopotamus. "They were," he says, "the monarchs of the region in which they lived." The larger forms measured twelve feet long, five feet across the loins, stood over six feet high, and weighed at least 6000 lbs. Their necks were much longer, and far more flexible than those of the existing elephants, and they had no trunk, but their heavy heads were armed with three pairs of horny protuberances, which suggested the family name of the group. One pair of horn cores was near the nostrils (nasal), another (maxillary) on the cheek bones, and the third (parietal) near the top of the head. These defensive weapons were most developed in males, which were also furnished with large upper canine teeth so enormously developed, as to form two decurved tusks often some inches long, and fitting into a protective depression in the lower jaw, a special character of this group of animals. The molar teeth foreshadow the rhinocerine type. The dinocerata limb-bones were large and solid, and the foot flat-footed with five toes in each foot, the hinder pair being the smaller. The mode of union of the composing bones intermediate between that of the odd-toed and even-toed hoofed mammals, bridges over—as Huxley long ago predicted the earlier fossil forms would—the gulf between those two divisions of the ungulata.

(*To be continued.*)

* Dinocerata, an extinct order of gigantic mammals, by Othniel Charles Marsh. Vol. x. of the United States Geological Survey, Washington, 1884. The publication of this article has been accidentally delayed. (Ed. Sc.-Gos.)

M. TULASNE, the distinguished French botanist and fun ologist, is dead.

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

VENUS will be an evening star during the first half of the month, and a morning star near the end of the month, setting about 7.29 P.M. on the 1st, 7.11 P.M. on the 5th, and 6.29 P.M. on the 12th, and 5.41 P.M. on the 19th of the month. The fact that this planet sets so early should not discourage observations being made of it, as it is best seen with a telescope in twilight.

Mercury will be too near to the sun for observation this month.

Saturn will be almost stationary in Gemini, setting on the 5th about 5.19 A.M., on the 12th about 4.52 A.M., on the 19th 4.23, and on the 26th at 3.55 A.M.

On the 2nd of February Mercury, and on the 5th Venus will be in conjunction with the moon.

On the 12th of February there will be an occultation of γ (*gamma*) Centauri, a star of the fourth magnitude.

I am indebted to Mr. W. G. Lettsom for the following very interesting notices from the "Astronomische Nachrichten."

On the 16th of November the brothers Paul and Prosper Henry, of the Paris Observatory, discovered a new nebula in the Pleiades by means of *photography*. It appears to start from Maia, taking at first a westerly direction, and then turning abruptly towards the north. On three occasions, namely on the 16th of November and on the 8th and 9th of December, photographs of it were taken; but as yet it has not been visible to the eye in any of the instruments at the Observatory. This nebula is about 3′ in extent.

Position of new star now known as Nova in Orion, R.A. 5 hr. 48 min. 59 sec., Declin. N. 20° 9′ 13″; it is therefore near χ (*chi*), known also as 54, a star visible to the naked eye. Its colour is said by one observer to be a beautiful orange yellow, by another decidedly yellow. On the 18th of December it was estimated of the 6·5 magnitude.

Discovery of a new comet by Brooks on the 26th and 27th of December. First telegram, 12 hr. 56 min. G.M.T., R.A. 19 hr. 52 min., Dec. N. 4° 8′. Second elegram, 28th of December, 11 hr. 44 min. G.M.T., R.A. 19 hr. 59 min. 2 sec., Dec. N. 4° 31′. The physical appearance is: Circular, 3′ in diameter, ninth magnitude, strong eccentric condensation, no tail.

Speaking at the Royal Astronomical Society of the meteor shower of the 27th of November, Mr. Common said: "I was observing the meteors with a field-glass for some time, and some of the brighter ones that left streaks behind, visible to the eye for two or three seconds, were visible in the field-glass for nearly a minute. They had a peculiar appearance, such as you see in De la Rue's vacuum discharges, like a row of coins slightly separated. Another thing that very much surprised me was, when the sky cleared between six and seven, and when there were not many meteors visible to the naked eye, there were a good many visible with the field-glass. When observing this display between 5.20 and 5.25, no first magnitude stars were visible through the haze, and yet behind this haze I saw several bright meteors flash. From a quarter to six to seven o'clock, when the sky was less clouded, I counted them at the rate of twenty to thirty a minute, looking at one part of the heavens alone. The most noticeable feature was the number of small meteors that were seen, and with the aid of the telescope the great length of time that the trains of the large meteors lasted. I noted one about 6.45, that exploded over Cassiopeia, which was far beyond a first magnitude star, and more like Venus at her brightest."

Mr. Nathaniel Green states, that on the 15th of December he observed Saturn with a reflecting telescope, and power 560, and he found, "the markings of the outer ring were most clearly defined; there is no dark line indicative of division, but a band of shading rather nearer to the outer than its inner edge. . . . The small light belt following the broad dark one next the equator, which was so wide in 1883, and less distinct in 1884, is now barely visible."

In the drawing of Saturn made by the writer in 1868, two of these small light belts are clearly visible on the globe of the planet in this position.

The mean temperature of the week ending the 12th of December was ten degrees below the average for twenty years. In the week ending the 19th of December the temperature was 1·6 above the average. In the week ending the 26th of December the mean temperature was 0·1 below the average. In the week ending the 2nd of January the mean temperature was two degrees above the average. The mean temperature of January for Lincoln is 38°, for London 39°, and for Brighton 40°; it is, therefore, the coldest month of the year. The mean temperature of February for Hull is 40°, for London 41°, and for Southampton 42°; the average temperature of the month is, therefore, two degrees warmer than January.

The rainfall during these four weeks was but very little over ¾ of an inch, yet it should be borne in mind that this is equal to about 77 tons to the acre. The average rainfall for January is in London full two inches, and between London and the south coast it is three inches, which is about 340 tons to the acre

The winter of 1884–1885 was a long, cold, dry winter, and the summer of 1885 was a cold dry summer. I do not think it has been remarked how much the weather during these twelve months was influenced by the fact, that we had an unusual number of overcast days, followed by clear nights.

The clouds by day of course shut out the heat of the sun, while the absence of clouds at night allows the heat of the earth to radiate into space, and thus the conditions of temperature are unfavourably affected in both ways.

OUR SCIENTIFIC DIRECTORY.

[It is our desire to bring out a Scientific Directory in the monthly pages of SCIENCE-GOSSIP, feeling certain that it would be very useful for our readers to know what scientific societies had been formed in their own neighbourhoods. We shall therefore feel very much obliged if Secretaries of any kind of Scientific Society, in any town or part of the country, will send us the full name and title of each Society, together with the names of the President and Hon. Secretary.]

Bedford Park Natural History and Gardening Society: President, Rev. J. W. Horsley, M.A.; Vice-President, Mr. R. B. Sharpe, F.L.S., F.Z.S.; Secretary, Mr. R. J. G. Read.

Bristol Microscopical Society (founded 1843): President, C. T. Hudson, LL.D., F.R.M.S., etc.; Hon. Secretary, E. B. L. Brayley, Clifton.

Chichester and West Sussex Natural History and Microscopical Society: President, Rev. F. H. Arnold, LL.B., etc.; Hon. Secretaries, Joseph Anderson, jun., Alre Villa, Chichester, Alfred Lloyd, F.E.S., F.C.S.

Colchester Students' Association (founded 1881): President, James Round, Esq., M.P.; Hon. Secretary, Mr. T. Forster.

Croydon Microscopical and Natural History Club (established 1870): President, H. T. Merrell, F.L.S.; Hon. Secretary, W. L. Sarjeant.

Dover Field Club and Natural History Society: President, S. Webb; Hon. Secretary, Rev. D. Robinson.

Louth Naturalists' Society: Patron, Rev. W. W. Fowler, M.A., F.L.S., Lincoln; President, Edwin Hall; Vice-President. A. R. Yeoman, M.A.; Hon. Secretary and Treasurer, H. Wallis, Kew.

Manchester Microscopical Society: President, Dr. Tatham; Hon. Secretary, George Wilks, 27, Wynford Street, Weaste.

Norwich Science-Gossip Club (instituted 1870): President, Mr. A. W. Preston, F.R.Met.Soc.; Secretary, Mr. F. H. Ellingham.

Penzance Natural History and Antiquarian Society (founded 1839): President, Wm. Bolitho; Hon. Secretaries, G. B. Millet and E. D. Marquand.

Sheffield Microscopical Society: President, W. Jenkinson, Esq.; Secretary, Alfred Draper, 275, Abbeydale Road.

Society of Amateur Geologists, No. 31, King William Street, London, E.C.: President, Professor G. S. Boulger, F.L.S.; Hon. Secretary, Mr. G. F. Harris, F.G.S.

Sydenham and Forest Hill Microscopical and Natural History Club: President, Mr. E. L. C. P. Hardy; Hon. Secretary, Mr. A. C. Perrins, 12, Sunderland Villas, Forest Hill, S.E.

SCIENCE-GOSSIP.

IN the United States, picture-frames are now made of paper. Paper-pulp, glue, linseed oil, and carbonate of lime, or whiting, are mixed together, and heated into a thick cream, which, on being allowed to cool, is run into moulds and hardened. The frames are then gilded or bronzed in the usual way.

DR. THOMAS ANDREWS, F.R.S., the distinguished chemist, has died at Belfast, aged seventy-two. Another well-known chemist, Mr. Alfred Tribe, has died at the comparatively early age of forty-six.

SCIENCE will be a gainer by the return of Sir Henry Roscoe, Professor of Chemistry, Queen's University, as one of the Members of Parliament for Manchester.

DR. HENRY WOODWARD, F.R.S., editor of "The Geological Magazine," has been presented with a silver tea and coffee-service, and a cheque for £253, as a testimonial by the readers and contributors of the above magazine, in celebration of his having edited it for twenty-one years. Professor Bonney made the presentation in the rooms of the Geological Society, Burlington House.

THE electric light, supplied by a portable battery, has been applied for lantern illumination. This will be good news to lecturers, who have been tortured by the oxy-hydrogen light.

SEASONAL dimorphism is stated by Dr. F. Dahl to occur in spiders. This author has already pointed out that *Micrommeta virescens* and *M. ornata* were simply two broods of the same species. He now states that *Meta segmentata* and *M. menger* are respectively spring and summer broods of the same species of spider.

WE are pleased to find that Mr. D. Morris, M.A., F.G.S., Director of the Public Gardens, Jamaica, has been appointed Assistant-Director of the Royal Gardens, Kew.

DR. J. W. WILLIAMS has been deputed by the Council of the Practical Naturalists' Society to make a survey of the migration of British birds, and to draw up a list of species migrating, including such as have recently become rare or extinct. He will be glad if any of our readers will help him in the matter by sending him records of arrivals, departures, &c., and also the meteorological conditions prevailing. His address is 27, Corinne Road, Tufnell Park, London, N.

IT has been discovered that New Caledonia contains coal, for Carboniferous strata have lately been found near Noumea, and also on the western side of the island.

Mr. J. W. Slater has demonstrated that caterpillars are affected by magnetic currents, which hinder their development, and even kill them. His experiments were conducted on the larvæ of the Cabbage White. The non-magnetised larvæ from the same brood were all right.

We have received No. 70 of the useful "Natural History and Scientific Book-Circular" of Messrs. William Wesley & Son, of 28, Essex Street, Strand.

We observe that the Herbarium of the late Mr. J. F. Robinson, the well-known Cheshire botanist, is offered for sale. This is an opportunity to get an admirably preserved collection of plants not often presented.

Mr. T. Meehan, the well-known American botanist, holds that the spines of cactuses, which are simply modified leaves, and have hitherto been regarded as protective against browsing animals, have another defensive function—that of breaking the force of the sun on the plant, and of practically lowering the temperature.

Dr. Hansgirg has shown that many genera of Algæ are polymorphic, and that many so-called special forms may develop one out of another.

We have to welcome another monthly candidate for public recognition—"The Scientific Inquirer," edited by Mr. Alfred Allen. It is intended to be a medium through which the reader may ask for and obtain information on every scientific subject.

Mr. Robert Paulson encloses us a specimen of milk-wort (*Polygala vulgaris*) gathered in flower at Orr, near Hastings, on the 5th of January.

Messrs. Swan Sonnenschein & Co. announce for early publication a "Pocket Handbook to the Flora of the Alps," specially adapted for botanical tourists, and edited by Mr. A. W. Bennett.

Mr. J. J. Harris Teall, F.G.S., is about to issue a work (in parts) on "British Petrography," with coloured plates by Messrs. Watson Bros.

Mr. G. A. Musgrave, F.R.G.S., has formed a Bird Preservation League, the members of which pledge themselves neither to purchase birds of beautiful plumage, nor to shoot rare birds.

In the "Transactions of the Entomological Society" for December there appears a lengthy and well written account, by Mr. Frederick Enock, of "The Life-history of *Atypus piceus*." Mr. Enock discovered this rare and beautiful spider on Hampstead Heath.

Mr. F. N. Williams, F.R.S., has published in the "Journal of Botany" an enumeration of the genera and species of the genus Dianthus.

A monograph on the Recent Brachiopoda, by the late Thomas Davidson, LL.D., F.R.S., edited by Agnes Crane, will be issued in three parts, with thirty quarto plates, during 1886, and will form a separate volume of the "Transactions of the Linnæan Society of London."

M. Charles Joly has re-published his "Notes on the Giant Eucalyptuses of Australia" (illustrated).

A lengthy and elaborate paper on "British Lizards" has been read before the Warrington Field Club, and re-published, by Mr. Linnæus Greening.

"The Moon and the Weather" is the title of a pamphlet written by Mr. Walter L. Browne. In it the author re-considers the probability of lunar influences, and forecasts the storms for the current year.

Professor Main, well known as the author of various books on the marine steam-engine, died on the 28th of December last.

One hundred and fifty tree-ferns (represented by four species) have been forwarded from the Melbourne Botanic Gardens by Mr. W. R. Guilfoyle, F.L.S., to form a "Fern-Gully" at the forthcoming Colonial and Indian Exhibition.

We are profoundly distressed to notice the death of an old friend, the eminent geologist, Professor Morris, for twenty-two years Professor of Geology at University College. He was a born teacher, full of love for his work, and possessed with the power of inoculating others with the same feeling. His death will be mourned by geologists all over the world.

MICROSCOPY.

Instantaneous Microphotography.—Mr. D. S. Holman has recently made some very important experiments in microphotography. Having succeeded in taking microphotographs of rapid vibrations, he determined to attempt to photograph the *Amœba proteus*, and other low forms of life, while in motion. His method was as follows: Having enclosed the material in one of the Holman Life Slides, and allowed it to remain until the Amœbæ had become accustomed to their new home and active, he cast an image of an Amœba on the ground glass of a camera, by means of a Holman Lantern Microscope, which is illuminated with the oxy-hydrogen light. A Zeutmayer one-fifth objective was used. A dry plate picture was then taken with about one-hundredth of a second exposure. Two exposures were made of one Amœba at intervals of three minutes, and one exposure of two Amœbæ in the field at one time. The photographs were a complete success, and were shown at a recent meeting of the Franklin Institute magnified ten thousand

diameters, making a picture of about eight feet on the screen, so accurate that the granular appearance of the protoplasm could be distinctly seen.

ENOCK'S ENTOMOLOGICAL SLIDES.—Mr. Frederick Enock is working out a novel and interesting scheme. He is issuing a series of slides, showing the mouth-organs of British Hymenoptera, especially bees. These are accompanied by explanatory drawings, so that a person can see at a glance the name of each part. The specimens are mounted naturally, so that there is no distortion, and they are seen in their natural colours. The heads are specially prepared for the paraboloid—the most suitable objectives for showing them being the two-inch, inch and a-half, and one-inch. The drawings are very neatly and artistically done, and the slides are superbly mounted.

COLE'S MICROSCOPICAL STUDIES.—The parts of the "Studies in Microscopical Science" for December are as follows:—Section 1. "Structure of the Sexual Organs of Reproduction in Angiosperms;" 2. "On the Disposition of the Organs in the Invertebrata" (illustrated by a transverse section of the common earthworm); 3. "Pathological Histology" (illustrated by section of the lung, showing *Carcinoma*); 4 has a beautiful plate of the *Trichina spiralis*, showing longitudinal and transverse sections × 250.

ZOOLOGY.

ABNORMAL DENTITION IN SLENDER MONKEY.—In the early part of the present year we received at the Bristol Museum, from the Clifton Zoological Gardens, the body of a young female monkey belonging to the common Indian species *Semnopithecus entellus*, F. Cuvier, the skull of which, now prepared and placed in the Museum, is remarkable from possessing a single supernumerary incisor. In the lower jaw there are two incisor teeth on the right side and three on the left. The presence of this extra incisor had caused the first or median left incisor to occupy a central position in the front of the mandible. Seeing that all these incisors are equally grown and well-formed, it seems impossible to decide which of the three on the left side is the redundant one. When the animal died the dentition was in a transitional state, consisting partly of milk and partly of permanent teeth. The alveoli of the two pairs of permanent incisors, as well as of the third pair of molars in both upper and lower jaws, with their contained teeth, are distinctly visible. Hence it is obvious that the extra incisor cannot be accounted for by the supposition of a mixture of permanent and persistent milk teeth. It also appears that if this monkey had lived to full age its dentition would have become normal. The following was the dental formula at the time of the animal's death:—

$$\text{In. } \frac{2,\ 2}{3,\ 2}\ ;\ \text{c. } \frac{0,\ 0}{0,\ 0};\ \text{p.-m. } \frac{2,\ 2}{2,\ 2};\ \text{m. } \frac{2,\ 2}{2,\ 2}$$

of which the incisors are deciduous and the remainder permanent teeth. It is well known that supernumerary teeth are occasionally developed in monkeys, as well as in man and other mammals. In a general way, however, when abnormal variations of this kind arise, they are *symmetrically* arranged. Asymmetrical variations are very much rarer; and although cases similar to the above have no doubt been noticed, I cannot at the moment find any record of a precisely analogous one.—*E. Wilson, F.G.S., Bristol Museum.*

SENSE-ORGANS OF THE BRACHIOPODA.—Professor Sollas has shown that the cæcal processes occupying the canals in the brachiopod shells are extensions of the outer epithelium of the mantle. At the outer end, which lies immediately beneath the chitinous periostraction, each terminates in a large cell, invested by smaller cells. The large cell is continued into a nerve-fibril, which runs axially down the cæcal process, and enters the nervous layer of the mantle. This is the structure of a sensory end-organ, which seems to transfer luminous radiations.

NOCTILUCA, ETC.—I have just been up the Persian Gulf, laying a cable; and while we were proceeding from Jask up the Gulf, in lat. 26° 25′ N., and long. 56° 11′ E., we encountered immense numbers of the minute phosphorescent *Noctiluca miliaris*, the centre reddish speck of which caused the water to appear in places as if covered with clotted blood. It was of the most intensely red colour, appearing in streaks and blotches all round. I caught quantities of it for examination. The water in places, when fished up in a bucket, seemed one mass of them, though in a small quantity they lost a good deal of their intense colour. Mixed up with them were a few pieces of the *Trichodesmium Ehrenbergii*, but very little. There were also quantities of sea-snakes and Medusæ. The sea was quite calm, and at night the steamer stirred up the most brilliant green waves I ever saw.—*D. Wilson-Barker, F.R. Met. Soc., Commander of T.S.S. "Dacia."*

THE COLOURING OF LAND-SHELLS.—After some conversation with a friend of mine on the absence and variety of colour in some of our land and fresh-water shells, I was led to try the following experiment. I took two specimens of *Helix aspersa* and five of *H. nemoralis*. The two former I placed in a glass jar bedded with grass, which from time to time was removed; four of the *H. nemoralis* I placed in a similar jar; number five I accidentally left in a cardboard box. After three weeks I noticed that the *H. aspersa* were losing all colouring matter from

their shells and turning to a dirty grey. Four weeks elapsed before any change occurred in the *H. nemoralis*, which now became quite white around the apex. The unfortunate individual in the card-board box I released after a month's imprisonment, and found that quite half of the lid and bottom of the box had been consumed, and that a broad grey band had formed around the lid. The *H. aspersa* next became covered with small porous-like warts, until they resembled pieces of pumice-stone. Upon being placed in the garden, the *H. nemoralis* soon returned to their former colour, but the *H. aspersa* kept in this condition for about two months, when I lost them.—*W. E. Collinge.*

RHOPALOCERA IN 1885.—One thing noteworthy last summer was the great abundance of several species of butterflies. Blues, for example, were very abundant; I think I hardly ever remember seeing the common blue (*Lycæna Icarus*) in such profusion. *Cœnonympha Pamphilus, Pyarga Megæra, Satyrus Tithonus, Pyrameis Atalanta*, and *Vanessa Io*, were also plentiful about the neighbourhood of Cambridge—the last-named species markedly so. Some butterflies too, which, like *Colias edusa*, are ordinarily scarce, put in an appearance last summer.—*Albert H. Waters, B.A. F.S.Sc., etc., Cambridge.*

MIMICRY IN BEES.—Those who read G. H. Bryan's paper (SCIENCE-GOSSIP, vol. xxi., pp. 241–243), "On Mimicry in Diptera," may be interested to know that there is an equally good article on another branch on the same subject, "Bees and their Counterfeits, or, Bees, Cuckoo Bees, and Fly Bees," by H. Noel Humphrys, beautifully illustrated with coloured figures and woodcuts, in the "Intellectual Observer," vol. i., pp. 165–173, for 1862. It is very pleasant reading, and well worth the perusal of all who, like myself, take a pleasure in keeping, studying, and profiting by the honey-bee.—*H. W. Lett, M.A.*

BOTANY.

THE ORIGIN OF CRYPTOGAMIC PLANTS.—An interesting paper on "Plant Life" was lately read by Mr. Morris Miles, hon. sec. of the Southampton Literary and Philosophical Society. The author advocated the exhaustive study of the lowest forms of vegetable life as offering a simple epitome of the physiological processes of more complex forms. He also sketched with much ability the geological story of the cryptogams, and expressed his opinion that the whole of the cryptogamic tribes, being fertilised by free-swimming motile cells, were originally of aquatic origin, and that they still pursue the modes of reproduction common to their ancestors.

DIANTHUS ARMERIA.—This pretty plant has such conspicuous bright red flowers that wherever it occurs it cannot fail to be noticed. For at least ten years I have observed it in abundance at Racton, Sussex. It was to be seen in the cornfields, by the road-sides, and by paths in the woods in great quantity; but during the last two seasons it seems to have almost or entirely disappeared—a circumstance I cannot in any way account for. Its recurrence, if such should be the case, I hope to look for. Has any similar disappearance been noted?—*F. H. Arnold.*

THE TRANSPIRATION OF PLANTS.—The Rev. G. Henslow, F.L.S., has been experimenting on the relative effects of different parts of the solar spectrum on transpiration. His experiments prove that Wiesner's results are correct; also, while recognising the fact that obscure heat-rays cause a certain amount of loss of water by evaporation, that transpiration, per se (theoretically distinct from the purely physical process of evaporation, which takes place from all moist surfaces and bodies, dead or alive), is especially referable to those particular bands of light, which are absorbed by chlorophyll; and that such light, being arrested, is converted into heat, which then raises the temperature within the tissues and causes the loss of water. The only additional fact here advanced, somewhat tentatively, is that yellow light has a retarding influence upon transpiration—that "life" has a retarding influence upon evaporation as distinct from transpiration.

PROLIFEROUS CARDAMINE.—Adverting to Mr. Taylor's note (p. 20) on *Cardamine pratensis* bearing small plants on the under side of the leaves, the cultivated double form of this species is commonly found with the leaves viviparous, and with the blooms also proliferous, like a hen and chicken daisy. The interest of Mr. Taylor's communication is that he has found the wild, and, I presume, single-flowered form of the species, with viviparous leaves. The fact has been observed previously, *vide* Dr. Masters's "Vegetable Teratology," p. 170, published by the Ray Society, 1869.—*J. J. Weir.*

FLORAL VARIETIES.—Plants of the cuckoo-flower (*Cardamine pratensis*), bearing gemmæ, or small buds, on the leaves, are very common in the damp meadows of this district—from an agricultural point of view, far too common, as the plants spread and form large patches, which do not improve the pasture. Albino varieties of *Geranium Robertianum* are not uncommon; but I have not noticed the petals such a pure white colour as Mr. Taylor's specimens: they have usually been a little cloudy.—*J. W. O., Pinner.*

PLANTS FROM THE ISLE OF WIGHT.—The following three plants have been forwarded to me from Ventnor during the past year or so. I do not know if they have been previously recorded in the

Island. 1. *Ornithogalum umbellatum*, from the hedgerow of a country lane, far away from any habitation. The specimen had all the characteristics of the French or Italian plant. 2. *Epipactis ensifolia*, sent to me from the woods of the Undercliff. Although not so uncommon in Hampshire, I have not before seen the species from the Isle of Wight. 3. *Polemonium cæruleum*, from the very heart of the island, growing by a running stream, but possibly escaped from cultivated ground. My correspondent, who forwarded the specimens, is the most indefatigable and accurate observer. — *C. Parkinson, F.G.S.*

VEGETABLE SYMBIOSIS.—Mr. A. W. Bennett, in "Nature," has called attention to cases of symbiosis between fungi and the roots of flowering plants. It is only three years since the doctrine of symbiosis was propounded, and then it was concerning the animal kingdom, or, at any rate, the animal and vegetable kingdoms together. It seemed a novel idea that certain animals actually had lowly organised forms of vegetation living within their tissues, so that reciprocal benefits ensued. Also that lowly organised animals associated with more highly organised ones, for mutual benefits. Such co-operation was fitly termed symbiosis—"living together." Mr. Bennett considers the fact to be now sufficiently established, that a considerable number of our forest trees do not draw their nourishment directly from the soil, but through the medium of an investing layer of fungus-mycelium. Dr. Frank has proved this by discovering that the roots of oaks, besides chestnuts, hazels, &c., are covered with a fungous growth, now called Mychoriza. Through it alone such trees get their nourishment from the soil. Dr. Frank thinks, that the well-known partiality of the natural order Cupuliferæ for soils rich in humus is now explained. The fungous growth first makes its appearance at the lateral roots of young seedlings, and is constantly replaced by fresh formation on older roots.

GEOLOGY, &c.

THE FOSSILS RECENTLY DISCOVERED AT COMMENTRY.—Mr. Charles Brongniart writes me, under date of the 20th of December: "Commentry is a town in the department of Allier, situated between Clermont and Montlucon; or, since our English maps perhaps are more commonly divided into provinces, in the Bourbonnais, and near the last-named town. They have there upper and lower coal-measures; the fossils are from the primary rocks. The mines of Commentry are rich in plants, insects, and fish. We are engaged in the preparation of an important monograph on the discoveries at Commentry; the insects alone will occupy twenty plates, as is probable in folio. As for the fish, Mr. Sauvage will undertake the ganoids; and Messrs. Renault and Zeiller will be occupied with the vegetation. Mr. Stanislas will undertake the description of the rocks, and Mr. Fayol writes the introduction, the geology, and the description of the mines. The figures of fossil insects already heliographed in the Bull. de la Soc. des Amis des Sciences naturelles de Rouen are quite sensational from their startling perfection, and confer a new quiet delight, such as our ancestors looked for in the Romance of the Rose."—*A. H. Swinton.*

SOCIETY OF AMATEUR GEOLOGISTS.—This society has successfully completed its first year of existence. A considerable amount of work has been done by its members, as the following record will show. Papers have been read at the meetings, on "The History of Geology," by Professor Boulger, F.L.S., F.G.S.; "The Geology of Belgium," by G. F. Harris; "The Foraminifera of the English Chalk," by H. W. Burrows; "The Origin and Varieties of Granite," by H. Fleck; "Notes on Palæolithic Man in relation to the Valley Deposits of North-West Middlesex," by J. Allen-Brown, F.R.G.S.; "Organic Acids and their Geological Effects," by Professor Boulger; "Volcanic Rocks," by Chas. Lane: "Chemical Action as a Factor in Geology," by Dr. Maybury; "The Deposition of Sediment, and Formation of Shingle Beaches," by G. F. Harris; "Underground Heat," by J. Starkie Gardner, F.L.S., F.G.S.; "The Modes of Occurrence of the Diamond," by W. J. Abbott; "How to Distinguish the Genera of Bivalve Shells," by A. Loydell. Excursions also have been made, under able directors, to Finchley, Caterham, Loampit Hill, Westcombe Park and Charlton, Croydon and Caterham, Erith and Crayford.

NOTES AND QUERIES.

SUNFLOWERS.—Among interesting facts respecting sunflowers recorded in recent articles, it does not appear that any reference has been made to their occasional habitat on the face of a brick-wall. In this neighbourhood, one of old-fashioned gardens, the walls carry a wide range of flora, which appear year after year, being well established. Among other plants, the sunflower has been observed by me in such a situation, and no satisfactory explanation has yet presented itself. Two instances of this occur at present (October) in my garden, and I will proceed to describe them. One sunflower grows from midway up the wall, the plant dwarfed to nine inches, without flower; the other from a foot above the surface of the ground, a strong plant of three and a half feet stature, with a flower of three inches diameter producing seeds. I noticed small plants similarly placed last year also, but am not able to give earlier experience, being a new resident. Are such occurrences rare, and what is the method by which such heavy seeds reach so peculiar a situation?—*Hahnemann Epps, Tulse Hill.*

PULEX IRRITANS.—In reading Mr. Robson's very interesting article on the development of a flea's egg, I notice that he does not make any reference to the food provided by the female for the sustenance of its progeny, until they reach the pupa form. If Mr. Robson has kept cats or dogs, he will have noticed at certain seasons that whatever they may happen to be in the habit of making a bed will be covered with a quantity of fleas' eggs; he will also find a number of small objects, of a deep red or black colour, having a curled or spiral form. These, no doubt, are composed of coagulated blood, which has been vomited by the female for the provision of its young. In hatching out eggs of Pulex for the purpose of watching their development under the microscope, I have always placed a quantity of these "preserved meats" in close proximity to the eggs, and have been much amused in watching the eagerness and avidity with which the young larvæ devoured them, and the rapidity of their change from a pearly white to a bright red colour.—*A. Jenkins, New Cross.*

INSTINCT IN PARROTS.—The two instances of peculiar conduct on the part of a parrot adduced by Mr. Lovett in the January number (p. 15) do not seem to admit of any very recondite explanation. They can scarcely be referred either to instinct or to reason, strictly so denominated, at least in an elevated sense. The whistling business was rendered possible by a very small effort of ordinary association of ideas, grounded upon the physical capacity of the bird to utter sounds somewhat similar to that of water dripping into a deep well, or issuing from a garden syringe. Whenever the syringe appeared, the volley of mellow notes forthwith ensued as a link in the association. The feat of planting the seed-tin on the top of the water-tin, in order to get rid of the former, was not marvellously clever. If the cage had been open, the encumbrance would probably have been pitched outside altogether, notwithstanding the danger of starvation or penury thereby incurred. The end that the bird proposed was simply to shuffle off what was in its way—no very lofty aim certainly. The means adopted were, firstly, a bungling attempt at the impossible, and secondly a very simple expedient indeed, considering the confined sphere of a closed cage. We may safely aver, that no general notion is required for the direction of actions such as these. The very lowest animal has, we believe, a faculty or function (call it "instinct," if you like) of avoiding obstacles which interfere with its life-progress. It is a faculty bound up and inseparably connected with life itself.—*P. Q. Kegan.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

VERB. SAP.—If our friends who send exchanges will kindly put their addresses at the bottom of their lists instead of the top, we shall be obliged.

M. E. POPE.—Your specimen is the long-tailed field mouse (*Mus sylvaticus*).

T. SIMPSON.—Your specimens are: No. 1, a growth of Callithamnion (a sea-weed), attached to the bladder of a larger seaweed (*Fucus vesiculosus*). No. 2 is quite another object, a zoophyte, known as the "bottle-brush coralline," from its shape (*Thuiaria thuia*).

F. HENDRY.—We are sorry your specimens have been waiting to be named so long, but the remarks made elsewhere will account for the delay. They are fossil shells imbedded in a piece of coal measure shale, and their name is *Anthracosia ovalis*. See Taylor's "Our Common British Fossils."

F. HARDING.—Your shells are as follows: 1, *Helix cantiana*; 2, *Helix virgata*; 3, *Helix rufescens*; 4, *Helix obvoluta*; and 5, *Cyclostoma elegans*.

C. H. JOHNS.—We are sorry to have delayed your answer, but our trip to the Antipodes will have to excuse us in this respect to all our friends. The slide you sent us contains one or two *mycelial* threads, but, as this is the initial growth of most funguses, it is impossible to tell the species.

F. C. KING.—Many thanks for your excellent suggestions. We are always glad to have the advice of "candid friends"—if not too "candid"! Your remarks shall be remembered.

C. A. N.—The special number of SCIENCE-GOSSIP devoted to Hepaticæ was published at the ordinary rate. It is, we fear, out of print; but if not, will very likely be obtainable of Messrs. Allen, Waterloo Place.

M. S. Many thanks for the correspondence you have sent us. We have put the name of the person in our "Black List," and will take care no more exchanges from him are inserted in our columns again.

W. TURNER.—The fungus on upper surface of leaf of *Cistus labilifera* was only in the mycelium stage, and therefore we cannot denote the species. The best work on the Mucorini is Dr. Cooke's "Handbook of the British Fungi," 2 vols. Several articles (illustrated) on the smaller British Fungi appeared in the vol. of SCIENCE-GOSSIP for 1880. "Grevillea" can be obtained, we believe, by ordering it from the Editor, 146 Junction Road, London, N.

EXCHANGES.

HUMMING-BIRDS' skins in good preservation, SCIENCE-GOSSIP vol. for 1884 in numbers, clean. Desiderata: Microscopic slides, works on Natural History, pupæ of Lepidoptera, British birds' eggs, or offers.—Joseph Anderson, jun., Alre Villa, Chichester, Sussex.

WANTED, No. 2 of "Knowledge" to purchase, or exchange for British Lepidoptera.—Joseph Anderson, jun., Alre Villa, Chichester.

BRITISH and American birds' eggs for others not in collection; British Algæ and American shells, for Lepidoptera, Minerals, Fossils or Shells.—Dr. J. T. T. Reed, Ryhope, near Sunderland.

WANTED, vols. of SCIENCE-GOSSIP from 1868–1872, bound or unbound; also other scientific books. Will give good microslides in exchange.—Samuel M. Malcomson, M.D., 55 Great Victoria Street, Belfast.

SCIENCE-GOSSIP 1883 bound, 1884–5 loose: what offers in science books?—Thos. Hendry, 11 Poplar Street, Bolton.

HOOKER'S "Students' Flora of the British Islands;" "Wild Life in a Southern Country;" "Naturalist," 1878–79; "Proceedings of Nat. Hist. Soc. of Dublin"; "Sermons in Stones," etc. etc., in exchange for "Popular Science Review," or other books, or offers.—Rev. W. W. Flemyng, Coolfin House, Portlaw, co. Waterford.

WANTED, members for an ever-circulating magazine devoted to astronomy and general physics.—Albert H. Waters, B.A., F.S.Sc., etc., Willoughby House, Mill Road, Cambridge.

MACLEAR'S "Old Testament History" (4*s.* 6*d.*), Bantam's "Extempore Speaking" (2*s.* 6*d.*), Sauer's "Italian Grammar, with Key" (8*s.* 6*d.*), Elwall's "Spanish Grammar" (1*s.* 6*d.*), Elwall's "Italian Triglot Dictionary," vol. 1 (2*s.* 6*d.*), "Logic Primer" (1*s.*), "English Literature Primer" (1*s.*), all new. Offers in microscopic and lantern slides, skeletons or any natural history objects.—C. Rowland, Brampton, Cumberland.

A FEW good micro-slides, including stomach of sea-mouse, T. S., stained stem of sun-flower, T. S., double-stained, and other good slides and unmounted material; also foreign stamps, and specimen of the African weaver-bird's nest, for good machine drawings or other offers in books, etc.—Peter Kilgour, 11 Stirling Street, Dundee, N.B.

MICRO-SLIDES. Duplicates (chiefly foreign diatoms) in exchange for others.—R. T. Ditchfield, Chorley, Lancashire.

WANTED, for a beginner, imagos of Edusa, Cardamines, Sybilla, Cardui, Atalanta, Io, Argynnidæ, Lycænidæ, and other common species; also some common moths. I will give in exchange a neat book store-box, 15 by 11 in., corked, gold lettered, or choice flower-seeds. All offers answered.—R. Laddiman, Hellesdon Road, Norwich.

WANTED, Davis's "Practical Microscopy," Carpenter's, Hogg's, or Beale's, newest editions. Will give good micro-slides in exchange for any of the above.—W. Sim. Gourdas, Fyvie, N. B.

WELL-MOUNTED palates of periwink, *L. littorea*, land and freshwater snails, and other mounts. Wanted, good anatomical and botanical slides, selected diatoms, and good unmounted material, micro. apparatus, etc.—J. C. Blackshaw, 4 Ranelagh Road, Wolverhampton.

L. C. 7th edition. Oblata: 33, 39, 40, 95, 97, 129, 157, 179, 183, 189, 201, 206, 211, 216, 273, 274, 281, 317, 360, 366, 375, 383, 386, 393, 475, 487, 489, 501, 534, 548, 553, 568, 570, 571, 573, 581, 595, 624, 644, 653, 654, 660, 668, 695, 711, 717, 738, 741, 757*c*, 841, 853, 858, 873, 895, 913, 915, 917, 928, 931, 934, 957, 968, 1029, 1032, 1039, 1040, 1053, 1055, 1056, 1092, 1132, 1137, 1148*a*, 1210, 1249, 1258, 1263, 1267, 1274, 1290, 1291, 1294, 1315, 1317, 1326, 1341, 1349, 1354, 1377, 1381, 1382, 1383, 1405, 1409, 1411, 1420, 1447, 1450, 1452, 1455, 1459, 1469, 1482, 1520, 1525, 1542, 1568, 1569, 1588, 1607, 1617, 1627, 1634, 1636, 1640. For exchange: send list to C. Copineau, Juge à Doullens (Somme), France.

SCIENCE-GOSSIP, 4 vols., 1882–1885, and "Knowledge," vols. i. ii. iii., all bound plain cloth. What offers in Herbert Spencer or Darwin's works?—W. Hardie, 1 Fingal Place, Edinburgh,

DUPLICATES: *Planorbis lineatus*, *Ancylus fluviatilis*, *Helix Cartusiana*, *H. caperata* v. *major*, *H. ericetorum* v. *minor*, *Pupa secale*, *Vertigo pygmæa*, *Balea perversa*, and *Clausilia Rolphii*. Desiderata: British Land and Freshwater Shells.—C. H. Morris, School Hill, Lewes.

WANTED, museum specimens of an ethnological and anthropological character. A large selection of microscopic slides of marine life, etc.; North American and British shells; Crustacea, and other specimens offered in exchange.—Ed. Lovett, West Burton House, Outram Road, Croydon.

WANTED, Nos. 102, 190, 193, 194 196, 197, 220, 221, 222, 223, of Newman's "Entomologist," also "Entomological Monthly Magazine," Nos. from 49 to 55, inclusive of vol. 5, and "Archæologia Cantiana," vol. 1.—F. Frohawk, Park Place, Eltham, Kent.

WANTED, Nos. 203, Nov. '81; 208, May '82; 213, Sept. '82; 215, Nov. '82; 219 to 237 inclusive, March to Sept. '84; in all 23 Nos. SCIENCE-GOSSIP, to complete set. Offered duplicates from co. Dublin of *Helix aspersa*, *nemoralis* and vars., *rufescens*, *pisana* and var., *alba*, *virgata* and vars. *albicans*, *maculata*, *leucozona* and *alba*, *caperata*, and *Bulimus acutus* and vars., or will collect and forward specimens of Land, Freshwater and Marine Shells.—J. Roland Redding, 103 Seville Place, Dublin.

WANTED, deep-sea soundings, shore gatherings, foreign or English chalks, or other material containing Foraminifera or Polycystina First class micro-slides or cash in exchange.—Jackson, Hillfold, Bolton.

WHAT offers in exchange for a Geological Show-case, 3 ft. 10 in. × 2 ft. 2 in., 11 in. deep, with 6 slanting shelves, glass doors, lock and key, also Woodward's "Geology of England and Wales," and "Manual of Mollusca."—Geo. E. East, jun., 10 Basinghall Street, London, E.C.

SCOTCH Graptolites offered in exchange for tropical shells, or for rare fossils.—Miss F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

A LIMITED number of first-class microscopical mounts in balsam, of portions of elytron of scarce diamond beetle—most beautiful object—for other first-class mounts of insects or botanical sections.—A. B. Hoskings, Ventnor Cottage, College Park, Lewisham.

WANTED, British and foreign books on marine algæ. Offered, scientific and other books, excellent slides of marine algæ in fruit, or cash.—T. H. Buffham, Hughenden Villa, Comely Bank Road, Walthamstow.

MICRO-SLIDES: a series of Exotic Ferns, showing the sori, etc., in exchange for other good slides. Also three or four different fern spores for exchange.—W. Henshall, The Hollies, Bredbury, near Stockport.

WANTED, Hartng's or other good book on British land and freshwater shells, in exchange for the first 20 parts of "European Butterflies and Moths" including this month's.—A. E. Dodridge, 7 Wharton Street, W.C.

WANTED, a good case of dissecting instruments for microscopic and other purposes. Apply stating requirements to—F. R. Rowley, 60 Lower Hastings Street, Southfields, Leicester.

FOR exchange, *S. corneum*, *A. cygnea*, *Bythinia tentaculata*, *Planorbis vortex*, *Planorbis complanatus*, *L. peregra*, *H. hortensis*, *H. virgata*, *H. ericetorum*, *Clausilia rugosa*, *Cyclostoma elegans*. Desiderata: land and freshwater shells, *H. pisana*, *H. lapicida*, *L. auricularia*, *Paludina contecta*, and others.—Frederick Harding, Shipley House, York Road, Eastbourne.

MANY slides of foreign Polyzoa well mounted, and true to name, in exchange for other slides: good diatoms preferred. Send lists to—Rev. A. C. Smith, 3 Park Crescent, Brighton.

FOR disposal, small collection of British shells, on tablets; Gosse's "Marine Zoology," Rimmer's "Land and Freshwater Shells," and Pascoe's "List of British Coleoptera," all clean.—J. B. Mayor, 5 Queen's Terrace, Longsight, Manchester.

WANTED, nests of magpie, tree pipit, lesser whitethroat, kingfisher, yellow wagtail, dipper, redstart, and house martin, complete; good exchange given in eggs.—A. A. Shaw, Market Buildings, Ashton-under-Lyne.

L. C. 7th edition, offered: 89, 261, 232*b*, 196, 406, 315, 316, 931, 1056, 1125, 693, 1614, 1615, 1596, etc.; many desiderata.—W. S. Harrison, 15 Park Place East, Sunderland.

WELL-MOUNTED micro-slides of fish-scales: Sudak, and species of Corregonus, from Russia; Ballan wrasse and others; to exchange for other good mounts.—Rev. H. W. Lett, M.A., Loughbrickland, co. Down.

A NUMBER of duplicate flint, greensand, and other fossils for disposal.—J. A. Floyd, 18 Whiting Street, Bury St. Edmunds.

"ZOOLOGICAL ATLAS" (vertebrata) by D. M'Alpine; "British Fossils," by Morris; "Fossil Merostomata," part 1, by H. Woodward. Land, freshwater and marine shells from Ceylon and India. Several osteological specimens offered in exchange for a good series of Continental fossils or offers.—Miss Linter, Arragon Close, Twickenham.

WHAT offers in exchange for two years' "Northern Microscopist"?—Henry Vial, Crediton.

VARIOUS injected tissues, either uncut or in sections, for magic-lantern slides, stereoscopic slides, or offers.—Henry Vial, Crediton.

WHAT offers for *Bulimus labio* in good condition?—Chemicus, 8 Trinity Street, Hastings.

WANTED, living Hydrozoa and Polyzoa, also good works on British Zoophytes: state wants.—Chemicus, 8 Trinity Street, Hastings.

WANTED, a ½ inch O. G., and a stand condenser, in exchange for a 6 large-cell granule battery.—G. H., 8 Tothill Street, S.W.

WANTED, the following numbers of SCIENCE-GOSSIP: 195, 202, 203 (1881), 205, 209, 210, 211, 214, 216 (1882), in exchange for well-mounted micro-slides.—Herbert Spencer, 10 Avenue Road, Regent's Park, N.W.

WANTED, British Marine Shells or back numbers of the "Journal of Conchology," in exchange for land and freshwater, including *Pis. fontinale*, *Pis. pusillum*, *Pal. vivipara*, *V. antivertigo*, *Balea perversa*, *Cl. biplicata*, etc.—F. Fenn, 20 Woodstock Road, Bedford Park, Chiswick. W.

OBJECTIVES: two excellent new objectives—⅕-inch by Swift, 90°, ⅛-inch by Crouch, 40°—to exchange both for a good ⅛-inch. Mutual approval.—E. B. Fennessy, Pallasgreen, Limerick.

BOOKS, ETC., RECEIVED.

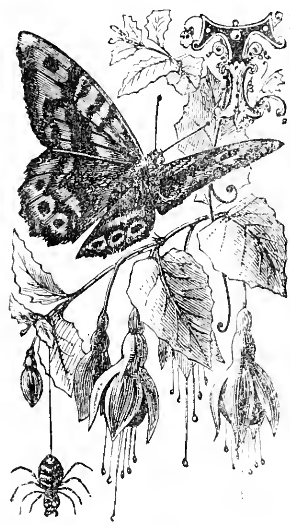
"Topography and Natural History of Lofthouse," 2 vols., by Geo. Roberts (Leeds: printed for the author).—"Practical Bacteriology," by E. M. Crookshank, M.B. (London: H. K. Lewis).—"The Light of Life," by Joseph John Kain (London: Wyman & Sons).—"List of British Marine Shells," by A. Somerville, F.R.S. (Glasgow).—"Polarised Light as applied to the Microscope," by Edwin A. Holmes.—"Geology, Chemical, Physical and Stratigraphical," by Joseph Prestwich, F.R.S. (Oxford: Clarendon Press).—"Reports of the Gold Fields of Victoria." 1885.—"The Gentleman's Magazine,"—"Belgravia."—"Hooper & Co.'s Spring Catalogue."—"Change in Land and Sea," by C. S. Whiting.—"The Naturalist."—"The Journal of Conchology."—"The Illustrated Science Monthly."—"The American Florist."—"The American Monthly Microscopical Journal."—"Cosmos."—"Science."—"The Amateur Photographer."—"Ben Brierley's Journal."—"The Rochdale Field Naturalists' Journal."—"Feuille des Jeunes Naturalistes."—"The Garner."—"Animal World."—"The Naturalist."—"The Midland Naturalist."—"The American Naturalist."—"Canadian Entomologist," &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM:—J. J. H. T.—W. H.—E. W.—F. N. W.—A. E. D.—B. P.—G. F. H.—G. R.—J. M. R.—M. E. P.—J. F.—J. W.—E. A. S.—W. H.—Dr. J. W. W.—E. D. M.—W. L. S.—C. P.—W. B. G.—Dr. G. M. G.—J. F.—A. C. C.—J. T.—W. C. H.—T. H. B.—S. H. D.—A. B. H.—J. J. W.—H. W. K.—D. W. B.—E. B. L. B.—F. M. H.—C. A. N.—Dr. P. Q. K.—E. A. H.—A. W. P.—W. T. C.—P. Q. L.—H. C. F.—W. M. W.—L. J.—C. L. J.—S. C. C.—T. S.—J. H. B.—J. R. R.—H. F.—G. E. E.—J. C. H.—R. T. G. R.—T. D. A. C.—F. F.—T. F.—E. L.—W. W.—A. H. W.—G. W.—W. W. F.—R. P.—C. R.—J. W. O.—R. H. N. B. J. A. jun.—W. H.—J. T. T. R.—Dr. S. M. M.—C. H. M.—M. S.—T. H.—M. L. S.—C. C.—J. C. B.—W. S.—R. L.—R. T. D.—P. K.—J. T.—M. E. A.—W. S.—C. L. S.—G. I. E. H.—W. H.—H. S.—F. F.—C. F. W.—H. V.—H. W. L.—A. A. S.—F. R. R.—F. E.—J. A. F.—W. S. H.—J. W. O.—F. H.—A. C. S.—J. B. M.—G. F. H.—E. B. F.—W. S.—F. C. K.—C. S. W.—A. S.—J. F.—O. A. S.—E. M.—&c. &c.

THE HORNED HOOFED MAMMALS OF THE EOCENE PERIOD IN AMERICA.

By AGNES CRANE.

[*Continued from p.* 40.]



THIRTY species of Dinocerata, all from the middle Eocene deposits of Wyoming, the only locality in which their remain have been hitherto found, either in the New or the Old World,* are fully described and illustrated in the present memoir. They are all referred by Marsh to three well-marked genera, and of two, Dinoceras and Tinoceras, he has been able to give complete restorations. The least known is the Uintatherium of Leidy (*Uintat*, Indian name, and θηρίον, a wild beast). This, the smallest and the most generalised form, occurs in the lowest beds of the series. Dinoceras, Marsh, in the succeeding deposits, and Tinoceras (τίνω, to tear, κέρας, horn), the most specialised form in the upper beds only. All the dinocerata are shown to have the smallest proportionate brain, with the most reptilian characters of any known mammalian animals. Of ponderous build, and slow in movement, but well armed, they held their own while the conditions of life were suitable, but could not battle with changed or adverse surroundings. Thus their total disappearance, leaving no immediate successors, Professor Marsh holds to be fully accounted for by the elevation and drainage of the lake basin, and subsequent drying up of the swampy soil into hard ground on which they were ill-adapted for progression.

* Unless the Coryphodontidæ be considered Dinocerata.

Such was the life history of the extinct Eocene dinocerata as revealed by Marsh in a magnificent monograph which adds to the high renown of its author, and is in every way creditable to the Geological Survey of the United States Government, long famed for the value and surprising excellence of its publications. Here we may briefly refer to another publication just to hand, and representing the topographical branch of the same Survey, i.e. the new sheet of "the geological map of the United States, exhibiting the present status of knowledge relating to the areal distribution of geological groups, a preliminary compilation, by W. J. McGee, 1884." This embodies the published results of the different independent State surveys, with those of careful re-study of difficult points in the field, and as all doubtful and uncertain matter is excluded, it may be considered accurate so far as it goes. It is a work of which Americans may well be justly proud, as showing the immense efforts that have been made in grappling with so vast a portion of the New World, in tracing the outcrops of the great geological formations, and defining their exact boundaries. For the geological structure of rather more than four-sixths of the United States has been thus accurately determined, that is to say, all that portion stretching eastward from the outfall of the Colorado river to the Atlantic seaboard, and northwards from the Gulf of Mexico to the forty-ninth parallel. Washington Territory, Idaho, Oregon, U. and L. California, three-fourths of New Mexico, and half of Nevada and Arizona, with a small extreme S.W. portion of the empire state of Texas are left uncoloured. But it must not hence be inferred that nothing is known of the geology of the Pacific coast. The investigations of Cope in Oregon have revealed the presence there of miocene deposits, and the independent State surveys of California have accumulated much published and unpublished material; but this knowledge was not sufficiently defined as regards limit of outcrops, and

junction of formations for incorporation in the present map. The general appearance of the sheet, largely aided by the vast areas covered by many formations, is most pleasing to the eye. Its execution leaves nothing to be desired, for the colouring is refined and clear, a reference letter renders consultation easy and error impossible, and it is altogether creditable to the energy and talents of Mr. W. J. McGee, its compiler, and the topographical staff of the Government Geological Survey, which has its headquarters at Washington, D.C., with Major J. W. Powell, the ethnologist and earliest explorer of the cañons of the great Colorado river as director-in-chief. The nomenclature adopted for the respective groups of the Cainozoic, Mesozoic, Palæozoic, Azoic and Volcanic systems necessarily differs somewhat from that in use in Europe.—1, Quaternary; 2, Neocene (which includes the Pliocene and Miocene); 3, Eocene (and the Oligocene); 4, Cretaceous; 5, Jurasso-Triassic; 6, Carboniferous; 7, Devonian; 8, Silurian; 9, Cambrian; 10, Archæan; 11, Volcanic. A glance over the map shows that the peninsula of Florida is not such a recent product of gulf sand as Agassiz once reasoned, for it is largely composed of a well-marked ridge of Eocene rocks. The immense extent of the central carboniferous tract is reassuring, and the great stretch of cretaceous affords plenty of ground for the hope that the former shore-lines of those extensive chalk oceans may yet be discovered with the buried land fauna of that epoch, and that somewhere or other, sooner or later, Professor Marsh may yet disinter the remains of the first ungulate ancestors of the Eocene dinocerata mammals, whose forms he has so fully restored to us.

11 *Wellington Road, Brighton, Sussex.*

NOTES ON FASCIATION.

In last April's number of SCIENCE-GOSSIP, several instances are given showing that fasciation is often perpetuated by seed, and amongst the plants mentioned is that of the ox-eye daisy (*C. Leucanthemum*). The seedlings from the plant mentioned have flowered during the past season, and out of fifty-five plants, about twenty developed fasciated and abnormal flowers, some very mis-shapen, others only slightly fasciated. This result has to be taken with the fact that the seedlings have been growing in a much richer soil than the older plant was found in, and I have no doubt that the change of soil influenced to some extent the development of abnormal flowers; still the proportion of plants having abnormal flowers to those having no trace of fasciation shows that fasciation is perpetuated by seed. The extent to which soil influences abnormal growth is shown by the following cases. This summer a vine having its roots in a border outside, and its stem inside a glass house, developed a number of curious, flattened stems, or rather shoots, from the common stem; these shoots have proved very abortive, a condition due to their fasciated state. An examination of the border has shown it to be in a very wet condition due to the stopping up of a drain, the roots therefore have been feeding too rapidly on the rich wet soil, with the result that very sappy wood has been developed, a condition which is highly conducive to abnormal developments. In previous years, when the soil was in a normal state, no such development was noticed. On p. 86 of the volume for 1885, there is a case given of an herbaceous plant (*Sedum glaucum*), taken from a dry, rocky position to that of a damp loam, with the result that fasciation quickly affected the stem. I have been able to note again a similar effect with a totally different plant: tubers of *Tropæolum tuberosum* (a native of Peru) were planted out last April in a strong clay loam, with just enough light soil to give them a fair start; the result was very curious. At first the ordinary terete stems were developed, but as the season advanced the stems began to assume a ribbon-like shape, and in some instances, curvatures, and shapeless masses of stem; flower buds have been developed on the flattened stem, but have not yet opened.

A few bulbs of the same plant were inserted in a light sandy, dry soil, in another part of the garden, with the result that they have developed the ordinary terete stems, and have flowered freely, one stem only showing slight traces of fasciation; this stem with examples of the two previous stems are sent with these notes.

If the condition of fasciation was common with the ancestors of these plants, then its influence must have been transmitted through, first the seed and afterwards the tubers, the plants having been perpetuated for several years by the latter, as a means of reproduction, and in any case the condition of the soil has been an active agent in the development of these peculiarities.

JOHN W. ODELL.

Barrow Point, Pinner.

ENTOMOLOGICAL LITERATURE.

(MUFFET'S *THEATRUM INSECTORUM.*)

[*Continued from p.* 11.]

With the revival of learning, however, towards the end of the middle ages, a few persons resumed the pursuit of Natural Science. Among these the foremost was Conrad Gesner, a man born of poor parents at Zurich, A.D. 1516, but who seems to have been the most apt and indefatigable of men; His various biographers are full of admiration for his personal qualities, and his learning in all branches seems to have been, as Hallam says, "simply prodigious." The same author speaks of him as

"probably the most comprehensive scholar of his age." Gesner wrote on many subjects, yet his fame rests chiefly on his almost incredible achievements in Natural History, on which he wrote many volumes, all illustrated by thousands of figures drawn by his own hand from specimens in his collection, or executed under his own eye by his assistants. His museum of animals, plants, fossils, &c., brought visitors from all parts, and his correspondence was carried on with the learned men of every nation. When we consider that he accomplished all this while obtaining his living as a medical man, that he was always of delicate health, and died under fifty years of age, his achievements seem truly wonderful. He died in the scene of his many laborious studies, amongst the objects he had spent his lifetime in collecting—being carried at his own request to a couch prepared for him in his museum. Gesner's "Natural History" contained all that was previously known relative to animals. He filled up many gaps by his own personal observations, and thus completed five large folios with merely the History of the Vertebrata; before he reached the Invertebrata, death carried him off, A.D. 1565. Entomology, however, was not destined to come to the front just yet, for Gesner's posthumous papers on the subject fell into the hands of the well-known Joachim Kamerarius, with whom we leave them for the present.

About this time several other books on Natural History and Botany were published, one or two of which contained some slight notices bearing on the objects of our study.

The various books in which we may look with hope of success for any mention of insects, may be, for convenience, classed under the following heads:—1st, Medical works; 2nd, General histories of various countries, including books of travel; 3rd, Works on Natural History generally; and lastly, books on certain species of insects, conspicuous for their utility or otherwise. Under the first head—medical—we find many writers noticing insects briefly, mostly however in connection with their injurious effects on the bodies which they wound or sting, and the remedies for such attacks; and many species were also then used in medicine. Chief among such writings is the "Materia Medica" of Dioscorides of Anazarba, the first printed edition of whose works was not however published, till Conrad Gesner edited it at Frankfort, A.D. 1549.* Then followed Mathioli's "Materia Medica," which first appeared in fol. at Venice, A.D. 1554. This great Italian physician was much prone to credulity, yet his work had a long reputation. Also in Jodoc Willich's "Anatomie," † published in the same year, we find a dialogue on locusts.

* Another edition in 8vo., Parisiis, 1549.
† Dialogus de Locustis, in his Anatomie, 8vo, Argent., 1544.

In the next class, including general histories of countries and books of travel, we find the works of the great doctor and naturalist, Pierre Belon, who published a book at Paris A.D. 1554, "On many singularities and notable things found in Greece";* and, three years afterwards, a volume—"Portraits of Animals and Birds of Arabia and Egypt," †—both of which describe the most remarkable insects of the countries of which they respectively treat. Gesner has been called the "compiler," and Belon the "observer" of nature; the latter certainly, by his laborious research, made many additions to Zoology; he went on an expedition to the Levant, on purpose to collect specimens there.

In the third class, the first book on the list is that of Peucer, whose work on "Quadrupeds, Insects, &c.," was first brought out at Leipzig A.D. 1550, and went through many subsequent editions. ‡ Next we find one of our own countrymen, the learned Dr. Wotton, publishing at Paris, in 1552, a work on "Natural History" § in ten books, dedicated to King Edward VI. Dr. Wotton subsequently purchased Gesner's posthumous papers on insects, of which I spoke above, from Joachim Kamerarius. Another writer, according to Percheron, treats about this time of water insects, viz., Guillaume Rondelet, who filled a large folio in 1554 at Lyon, on "Fishes, &c." ‖ I cannot say, not having seen the volume, whether it contains very much of note entomologically, but Rondelet had a great knowledge of fishes—so much so, that his work has formed the foundation of all subsequent ones on the same subject, and indeed it is said that very little of importance has been added since to the natural history of the fishes of the Mediterranean. In the last class we find several small works on various species of insects noticeable for their utility, their ravages or otherwise. The first is a small volume by Chr. Hagendrophinus, ¶ published A.D. 1526; the next, in point of time, is by the Latin poet Marcus Hieronimus Vida, who was born at Cremona A.D. 1490: he wrote a long poem on "The Culture and Use of the Silkworm," ** which first appeared at Rome in 1537, and went through as many as nine subsequent editions, thus showing that there was no lack of interest in the silkworm at that time. Then the bees have their turn, for Giovanne Rucellai, an

* Observations de plusieurs Singularités et Choses mémorables trouvées en Grèce, Asie, Indée, Egypte, Arabie et autres pays estranges—in 4to, Paris, 1554; in 8vo, Anvers, 1558; in 8vo, 1589 (woodcuts).
† Portraits d'Oiseaux, Animaux, etc., d'Arabie et d'Egyte, in 4to, Paris, 1557 (woodcuts); another edit. 1618.
‡ Appellationes quadrupedum, insectorum, etc. etc., in 8vo. Lipsiæ 1550, Wittemberg, 1551, 1556, and 1558; Leipzig, 1559 and 1564.
§ De differentiis animalium libri decem; in fol. Parisiis, 1552.
‖ De piscibus marinis, universæ aquatilium historiæ pars altera (with good wood engravings) in fol., Lugduni, 1554-55, and a French Translation in fol., Lyon, 1558.
¶ Declamatio in laudem ebrietatis et encomium Muscæ, in 8vo. Hagenoæ, 1526.
** De Bombycis cura et usu, libri 2, in 4to, Roma, 1537; in 8vo, Lugduni, 1537; in 8vo, Basil, 1537; in 12mo, Antwerp, 1585; in 8vo, Cremona, 1560.

Italian, filled an 8vo volume with a poem describing their economy, which was first published, after his death, at Venice, A.D. 1539;* this, like the last, was evidently a popular work, for it went through five other editions, and we find it said by a contemporary writer that the "Bees," an imitation of the 4th Georgic of Virgil, was esteemed "a poem of exquisite sweetness." Two years after this (A.D. 1541) we find in volume i. of a book by Erasmus Ebernerus, a description headed "The Praise of Ants."† The next year, a German of the name of Ruscheyt brought out a volume ‡ describing the "Grasshoppers seen in Silesia in 1542"; two years later, we find a small work on "Fleas," by Moschetti,§ and in the year 1546 one Ant. Thylesius brought out a book on "Spiders and Glow-worms."‖

(*To be continued.*)

The very contrary, however, is the case, as the expenditure of a few shillings, and a little ingenuity, are all that are required in the way of outfit; and the hire of a boat during a few days' stay at the seaside will give amply sufficient opportunity of collecting to enable the naturalist to accumulate materials for weeks—nay, months—of study. It is with the view of showing this, as well as of publishing some improvements in appliances for the purpose, that the present paper is written.

The form of tow-net hitherto used has been a simple bag of bunting held open by a metal ring. The word "tow" is rather a misnomer, as, if towed at all, it must be at a very low rate of speed, as anything above a knot or a knot and a-half an hour would be sure to result in the destruction of the necessarily flimsy material of which it is constructed.

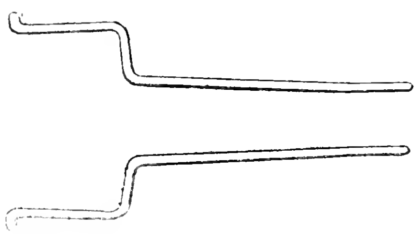


Fig. 36.—Long Section of Tube. One-third real size.

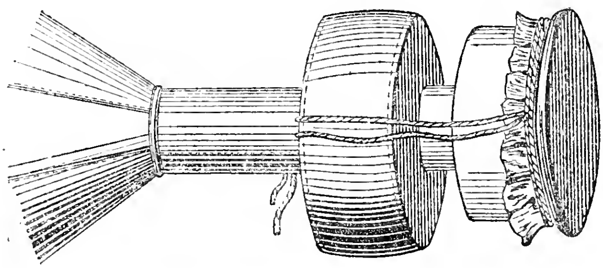


Fig. 37.—End of Net, with Tube fitted ready for use.

ON MARINE COLLECTING WITH THE SURFACE-NET.

By G. W. M. Giles, M.B.,
Surgeon, Bengal Med. Service; Naturalist, Indian Marine Survey.

MOST of the readers of Science-Gossip are well acquainted with the fact that the surface of the sea, especially near the coast, swarms with an immense variety of organisms, belonging mostly to the animal side of animated nature. Not, however, that vegetable forms are by any means wanting; for few hauls of the tow-net can be made which do not include a more or less considerable proportion of Diatomaceæ and other Algæ; but these do not present the wonderful variety that characterises the surface fauna. Few, however, I am convinced, of the ever-increasing army of field naturalists are aware of the simplicity of the appliances required for the work of collecting in this really delightful field, being apt to regard it as within the resources only of expeditions of the "Challenger" sort.

On this account, by far the best way of employing it is to fasten it to some fixed object, such as an anchored ship or buoy, in a moderate tideway. But, even used thus, a situation should be chosen where the currents are not too strong, as, apart from the risk of damaging the net, the organisms most commonly taken are so delicate that they become irretrievably spoiled if subjected for any length of time to the action of a strong tide.

About twelve months ago the writer was appointed naturalist to the Indian Marine Survey. As ships engaged in topographical work are necessarily employed, for the most part, in the shallow waters of the littoral zone, opportunities for deep-sea dredging occur only occasionally; and accordingly more attention was paid to the surface and littoral faunæ.

A very few days' trial of the ordinary bunting bag sufficed to show that it is a most imperfect piece of apparatus. The difficulty with it lies not so much in "catching your hare," as in getting him out of the trap for cooking. The method adopted is to invert the bag, and wash it in a bell-glass or bucket of sea-water. Not only, however, does a large portion of the catch remain sticking to the bunting, but that which is washed off is generally much mixed up with hairs and "fluff" from the material, and is moreover diffused through so large a volume of water that one is only one step better off than when they were free

* Apes, in 8vo, Venezia, 1539.
† Encomium Formicarum, Amphitheatr., Dornanii, t. 1, and with "Melanchthon" in 4to, Argent., 1541.
‡ Wahrhaftige Zeitung in Schlesien geschehen, 1542, von unerhörten Heuschrecken wie viel der gewesen, und was sie gehaden gethan haben, in 4to, 1542.
§ De Pulice, in 8vo, 1544.
‖ De Araneola et Cicindela, 8vo, Lutet., 1546.

in the ocean, the task of catching any individual specimen being much like the traditional quest for the needle hidden in a truss of hay.

After several experiments the under-described form of drift-net was devised, and it answers so well that, for surface-work, it leaves little to be desired. The essential point of the improvement lies in the tail of the net being composed of a glass tube, into which the whole of the catch is carried by the gentle current, which constantly flows through the net as it hangs in the tideway.

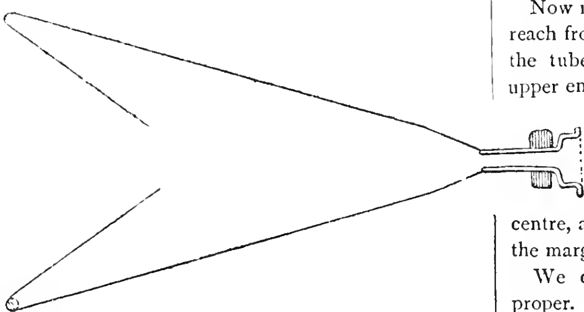


Fig. 38.—Outline section of Net and Tube.

do is to obtain a circular block of cork, about 2 inches thick and 4–5 inches in diameter. A hole large enough to admit the narrow part of the tube, but to hold it tightly near the shoulder, is then cut through the centre of it. Having fitted the cork thus on to the tube, place them together in a bucket of water, when, unless your tube be exceptionally thick, the whole will be found to float. Now gradually pare away the outer edge of the cork until the two together will just sink. The point should next be ascertained and noted at which the cork just balances the tube in the water in a horizontal position.

Now make a tube of strong calico long enough to reach from this point to the end of the small part of the tube, and fitting it closely, and sew on to its upper end a funnel-shaped piece of the same material spreading out rapidly to 6 or 8 inches in diameter. Cover your cork with a tight calico jacket, and then pass the lower end of the calico tube through the hole in its centre, and stitch its edge firmly to the calico forming the margin of the aperture in the jacket.

We come now to the construction of the net proper. Bunting, though commonly used hitherto, is a bad material for this, being too "fluffy." The

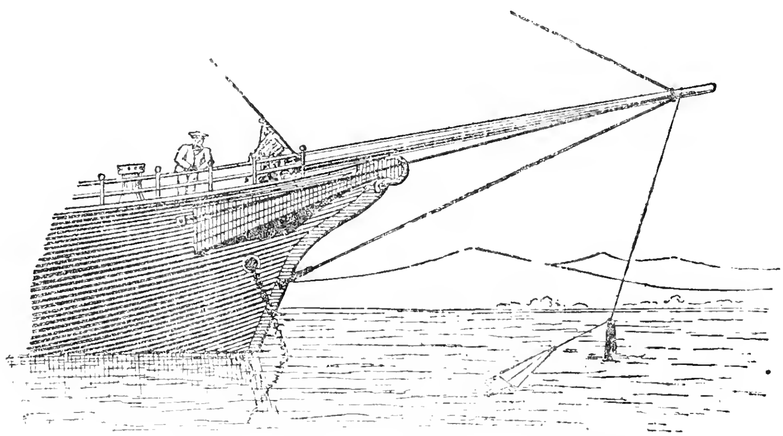


Fig. 39—Showing Net suspended from bowsprit end of ship.

The tubes employed for the purpose were chimneys from a large argand lamp, and these, though they might be improved in certain details, on the whole answer very well. Such lamp-glasses consist of a long tube about 1½ inches in diameter, terminating in a shoulder, which unites this to a shorter piece of considerably larger diameter.

For our especial purpose it would be better to have the long portion slightly narrower, and the part below the shoulder considerably wider than at present, say 3–4 inches in diameter. A thickened rim to the edge of this would be a further advantage. Such a tube would appear in long section as seen in Fig. 36.

Having selected a suitable tube, the first thing to

material that answered best was a very coarse but strong unbleached muslin, of native manufacture. I have no doubt, however, that something of the same sort is obtainable at home. Of this a conical bag is made, 18 inches in diameter at the mouth, 6 inches below, where it is sewn on to the top of the calico funnel, and 3 or 4 feet long. The mouth is kept open by a ring of brass wire about the thickness of a penholder. An inner conical bag about 18 inches long, opens below into the main bag. The opening, being 5 or 6 inches in diameter, is added to act as a trap to prevent any animals that may have entered from escaping.

In practice I have the two conical bags made in

one piece as a double cone, one seam of the smaller being left uncompleted, so that, when a net is worn out, all that is necessary is to turn this small cone over the ring, close the seam, and sew lightly together below the ring. The lower calico portion outlasts several changes of muslin. Three short lengths of cod-line are secured to equidistant points on the circumference of the ring and knotted together into a loop, about three or four feet from the net, which serves to bend on a piece of log-line, by means of which the net is hung in the water.

All being now "ready for sea," a piece of fine muslin is stretched over the large end of the glass tube, and tied behind the shoulder or rim with a piece of fine string, the ends of which are left a few inches long. The small end of the glass tube is now introduced, through the cork, into the calico tube; and, unless very tightly held, for extra security, the free ends of the string used to lash on the muslin are knotted together and tied behind the cork. Then, by means of the log-line, the whole is lowered overboard into the tide.

Fig. 37 shows the tube in place ready for use; Fig. 38, a long section of the entire apparatus.

And now as to the method of using it. By far the best plan is to make it fast to a small buoy in a place as little frequented by shipping as possible. For this purpose a small keg or beaker, anchored by means of a heavy stone, is sufficient, or, in harbours, advantage may be taken of the large buoys used to mark out the channels. Of course, when used from a rowing-boat, nothing more is necessary than to bring this to an anchor in a suitable situation, or to row her gently so as to make her just hold her own against the tide; but in a ship at anchor it is very difficult to find a situation where the net can be kept clear of the rubbish that is continually being thrown overboard.

The "Investigator," the vessel belonging to the Indian Marine Survey, is a paddler, and by rigging out a 20-ft. bamboo from the paddle-box, one is enabled to get pretty clean hauls; but in a screw-ship a much longer spar would be required. Perhaps, all considered, the best situation on shipboard is from the bowsprit end. But, in this case, to prevent the net from being carried aft against the bows, a 14lb. sounding lead must be made fast to the line, about a yard from the net, as in Fig. 39. In this situation none of the ship's rubbish can possibly get into the net; but to trust its application, and more especially the operation of drawing it, to one of the crew, is a somewhat hazardous experiment; and it requires a certain amount of nautical experience to enable one to go out on the spar with confidence. Moreover, in a passenger ship, one would certainly "get one's toes chalked," and have to "pay one's footing" for the exploit; but, these difficulties overcome, the perfect cleanness of the haul well repays the small extra trouble and, perchance, expense.

In withdrawing the net from the water, care should be taken not to do so too suddenly, as, unless raised slowly, so as to give time for the water to run out through the interstices of the muslin, the weight of water taken up is apt to burst the net. Before finally withdrawing the tube part from the water the ring should be once or twice dipped, so as to take up a little water, which washes through the bag and carries anything that may be left adhering to the muslin on into the tube. As soon as the net has been hauled aboard, the tube end should at once be immersed in a bucket of sea-water; and, holding it in this position, the bag part is removed by drawing off the cork ring. Now raise the tube until only about half or three-quarters of an inch of water is left in the large end. Insert a well-fitting indiarubber cork into the small end, and smartly invert the tube; after which the muslin may be removed from the large end.

On holding the tube up to the light it will, as a rule, be found to completely swarm with organisms of the most varied descriptions; and any individual that may be especially remarked may be captured at this stage by means of a section-lifter provided with a very long handle, and put aside. If, however, as is most commonly the case, the crowd is so dense that it is impossible to follow the motions of any individual specimen, the catch must be examined in successive small portions, in a large flat glass cell under the simple microscope. For work on shipboard, on account of the motion, it is necessary to have these cells deep in proportion to the depth of fluid they are intended to contain: $3 \times 2 \times \frac{3}{4}$ inches is a useful size.

(*To be continued.*)

ON THE VARIATION AND CONTINENTAL DISTRIBUTION OF THE BRITISH SLUGS.

By J. W. Williams, D.Sc., &c.

To me the slugs, with their near relatives the snails, stand as the greatest living protests to the promulgation of Linné of the stability of species. In one of his occasional addresses, contained in the "Amœnitates Academicæ," and entitled, "Oratio de tellure habitabili," the great Swede says: "Initio rerum ex omni specie viventium unicum sexus par fuisse creatum suadet ratio;" and this maxim held its ground until Cuvier followed him, and with a tincture of philosophy questioned the persistence of species; and the observations and logical deductions made by naturalists since his time, such as Geoffrey St. Hilaire, Lamarck, Oken, Goethe, Wallace, Darwin, Haeckel, and others, have furnished data to conclusively negative any adherence to the old doctrine of Linnæus. To-day in our own country the conchologists are

showing, with an assiduity which of itself commands the highest praise, the variations to which the species belonging to their special group are liable, and they are doing this not only from this one point, but, taking their distribution in space into consideration, they are prosecuting their labours to the utmost in order to reduce all these variations down to the causes that have produced them. And it has occurred to me that in working out the etiology of these variations there would be great aid rendered were the general distribution, both of themselves and of the type-forms, taken into account, and especially so where the geological formation of the several countries has been fully worked out. For this reason this paper has been written; and, in order to make it the more useful to collectors in this country, I have described in full all the named varieties of the slugs that are indigenous to this country, those that have as yet been recorded as British being denoted by an asterisk. And for those especially working at the slugs, I have appended a bibliography for further reference.

ARION ATER, Linn.—This slug is generally distributed over the Continent, ranging from Norway over France (particularly in this country it occurs in the north and centre) and Germany to Spain, Corsica, Italy, Sicily, and even into Africa and the islands of Madeira and the Azores. Its varieties with their distributions are as follows:—

Var. *virescens*, Müll.: animal greenish, with two lateral bands of an orange-yellow colour (= *A. virescens*, Müll.). French.

Var. *rubra*, Moq.: animal reddish or dull red, unicolor. French.

Var. *Draparnaudi**, Moq.: animal dark red, foot-fringe yellowish or reddish. Also French.

Var. *succinea**, Müll.: animal yellowish, unicolor (= *L. succineus*, Müll.). Also French.

Var. *bicolor** (V.-Broek), Moq.: animal dark brown, sides yellowish or orange. (This variety has been recently found at Louth by Mr. Wallis Kew.) Also French.

Var. *nigrescens**, Moq.: animal blackish, foot-fringe reddish or yellowish. Moquin describes this variety as French, and Locard has recorded it from Dauphiné and the Savoy.

Var. *marginata**, Moq.: animal black, foot-fringe yellow, orange, or of a red-lead colour. French.

Var. *Mülleri*, Moq.: animal black, keel pale greenish. French.

Var. *pallescens**, Moq.: animal dirty white, a little reddish or yellowish. Also French.

Var. *albida**, Roebuck: animal white, unicolor. Not yet recorded for any other country but England.

Var. *rufa**, Linn.: animal red or brownish, unicolor (= *L. rufus*, Linn.; "Syst. Nat." edit. x. 1758, p. 652). Also French.

Var. *albolateralis**, Roebuck: animal dark brown or blackish, with the sides white and the foot-fringe orange; the two last colours being very sharply defined from one another. (This beautiful variety, which was described in 1883, is only known from North Wales and Sussex.)

Var. *pallescens**, Roebuck: animal light yellow. This variety is closely identical with var. *succinca*, Müll., and ought perhaps to be associated with it.

Var. *cinerea*, Westerl.: animal ashy, with three lateral pale black bands. Scandinavian.

Var. *grisco-marginata*, Dumont and Mortillet: animal pale blackish, foot-fringe grey. Locard found this variety in the woods of Mount Saxonnet at 1000 mètres altitude. French.

Var. *nigra**, Dumont and Mortillet: animal black or blackish (= type).

Var. *aterrima*, Dumont and Mortillet: animal entirely black (= type).

M. Mabille records *Arion ater* from the following French districts, which show well the distribution of this species in that country: La Seine, Champagne, Haut-Rhin, Haute-Garonne, Agenais, Var, Dauphiné, Hautes-Pyrénées, Lozère, Ariège, Aude, Savoy, the Oriental Pyrenees, and the Vosges.

ARION FLAVUS, Müll.—This is a very doubtful species. Moquin-Tandon in his "Histoire naturelle des Mollusques de France," records three varieties as French, viz.:—

Var. *normalis*, Moq.: animal yellow, head and tentacles black.

Var. *pallida*, Moq.: animal pale, back slightly ashy, mantle yellow.

Var. *albida*, Moq.: animal whitish, mantle and sole of foot yellowish, tentacles blackish.

ARION HORTENSIS, Fér.—This, the garden slug, is a generally distributed species, both in England and on the Continent.

Var. *dorsalis*, Moq.: animal grey, with a black band on mantle and back. French.

Var. *leucophæa*, Moq.: animal bluish-grey, striped and spotted with black. French. Drouët records this from Troyes, and Normand from Valenciennes.

Var. *fasciata**, Moq.: animal grey, black bands. Also French.

Var. *nigra*, Moq.: animal black, with lateral grey bands. French.

Var. *Pyrenaïca*, Moq.: animal deep grey, with a blackish band on each side. Locard took this at Luchon. French.

Var. *grisea**, Moq.: animal pale grey, unicolor. Also French.

Var. *limbata*, Moq.: animal black or blackish, foot-margin orange or pale yellow. French.

Var. *alpicola*, Moq.: animal reddish-grey, black bands. French. Charpentier found this variety on the Alps. Found also by Lessona on the Lombardian and Piedmontese Alps.

Var. *rufescens**, Moq.: animal reddish, black bands. Also French.

Var. *subfusca*, Pfeiff.: animal brownish, with a black

band on each side. This variety has been recorded for Britain, but, I believe, on unreliable authority.

Var. *virescens*, Moq.: animal greenish, black bands. French.

Var. *aurea*, Lessona and Pollonera : animal white, back yellowish, mantle white, foot-margin yellowish gold ; bands of back and mantle obsolete. Italian. (" Questa varieta non si rinvenne finora che a Rivarossa in Piemonte."—Lessona and Pollonera. See Bibliography.)

Var. *nemoralis*, Dumont and Mortillet : animal of pale colour, with the sides scarcely coloured, with the mantle often of a lighter colour than the back.

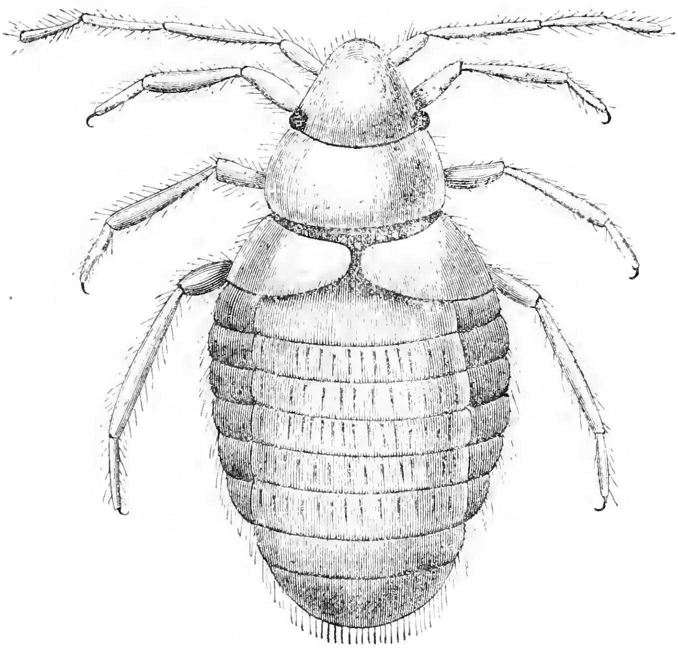


Fig. 40.—*Æpophilus Bonnairei* (× 16).

French. Locard found this variety in Savoy and Haute-Savoie.

Var. *alpestris*, Dumont and Mortillet : animal of a very deep colour, so that the bands on the mantle are not discernible. This was also found by Locard in Savoy and Haute-Savoie.

(*To be continued.*)

A MARINE HEMIPTEROUS INSECT.

THIS marine, or rather submarine, insect, which appears to have escaped the attention of English naturalists, is not uncommon on the coast of Jersey. Hitherto it has been recorded in one instance only (1879), as taken in the Isle of Rhé, in the Bay of Biscay, and described by Signoret in, I believe, the transactions of the Paris Academy of Science.

I first noticed it upon this coast in 1882, when I took three or four specimens in St. Clements Bay. I sent these to various friends for identification, but without result.

In 1884, while collecting in the same locality with Dr. Kœhler (of the Faculté des Sciences, Nancy), I called his attention to a specimen, which he at once recognised from the description of Signoret as the insect recorded from Rhé, and named *Æpophilus Bonnairei.*

We were fortunate in obtaining about a dozen specimens in that one tide ; Dr. Kœhler was thus enabled to make some observations on its anatomy

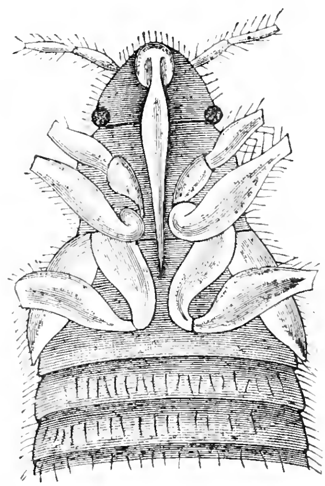


Fig. 41.—*Æpophilus Bonnairei* (underside × 16).

which are very interesting, and have now appeared in his "Recherches sur la Faune narine des Iles Anglo-Normandes."

The following is a description of the insect : Length, one-sixth of an inch ; breadth, one-twelfth ; colour, deep reddish-brown ; body, limbs, and antennæ closely covered with fine silky hairs of a yellowish tint ; eyes which are compound and very brilliant, ruby-red ; wings, the horny portion (it must no doubt be classed with the Heteroptera) alone developed. It lives under stones which are rather deeply set in the loose gravel, in proximity to rocks. That it is unquestionably marine is shown by the fact, that it is invariably found in company with such animals as Nereis, Phascolosoma, Astemma, and Gammarus. Upon some of these it no doubt depends for its subsistence. It is a nimble little insect, running with great rapidity, and, among the bits of

stone and coarse gravel, not by any means easy to capture.

The two or three localities in which I have taken it are covered at high tide by about three and a-half to four fathoms of water. How respiration is carried on during the period of submergence, which amounts during average tides to about seven hours out of twelve, and during neap tides to some sixty or seventy consecutive hours, is not easy to determine; for, from specimens which I have kept in a bottle and carefully observed, Æpophilus does not, like the aquatic Coleoptera, enclose air either among its hairs or under its rudimentary wings. Dr. Kœhler is of opinion that it must be able to suspend that function entirely during submergence.

It has but poor natatorial powers, and when put into a bottle of water seems quite helpless, unless it can get hold of some small stone or loose gravel in the bottom, under which it quickly disappears.

The figure which I send herewith gives a very good idea of the insect; but, as I have not a micrometer, I cannot give the exact enlargement; it is about × 16.

JOSEPH SINEL.

David Place, Jersey.

THE "Surrey Garner," edited by Mr. A. Ramsay, F.G.S., of which No. 1 has just appeared, commences with the mollusca of that lovely county, and also contains the editor's address, on "Surrey Scientific Researches," delivered as the presidential address at the annual meeting of the Lambeth Field Club last June.

THE GREEN GLAND OF *ASTACUS FLUVIATILIS.*

By DR. A. B. GRIFFITHS, F.C.S. (LOND. & PARIS).

THE so-called green glands of the fresh-water crayfish lie in the cavity of the head, below the front part of the cardiac division of the stomach. The openings of these organs are to be found at the base of each antenna. The organ, carefully dissected out of the head of a freshly killed crayfish, is seen to consist of two principal parts: an uppermost one, which is a transparent and delicate sac-like body filled with a clear fluid, and an underlying portion of a green colour, glandular in appearance, containing granular cells.

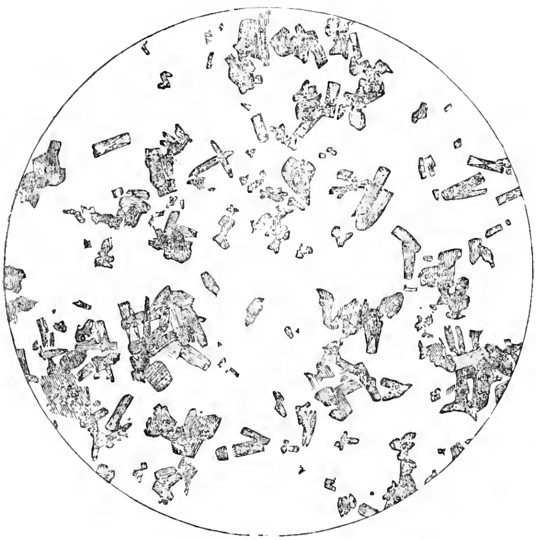


Fig. 42.—From a photograph of some of Uric Acid crystals isolated from the secretion of the green glands of several crayfishes, and mounted to form a slide for the microscope. In the above figure the urinary pigments coating some of the crystals are to be seen.

Fig. 43.—From a slide of Murexide, prepared by the action of nitric acid and ammonia on the uric acid obtained from the secretion of the green gland of *Astacus fluviatilis.*

Formerly, as is well known, these green glands were looked upon as the auditory organs of the animal; but in 1848 Professors Will and Gorup-Besanez (see "Gelehrte Anzeigen d. k. Baierischen Akademie," No. 233, 1848) said that this organ probably contained guanin, and from this time it has been considered as a secretory organ.

Having made a careful study of the secretion of this organ from a chemical and microscopical point of view, this memoir details my work and conclusions arrived at concerning this green gland.

The secretion of this gland is acid to litmus paper. On treating the secretion obtained from a large number of green glands with hot dilute sodium hydrate solution and then adding hydrochloric acid, a slight flaky precipitate was obtained; and, on examining these flakes under the microscope, they

were seen to consist of small crystals in rhombic plates. On treating the secretion with alcohol these rhombic crystals are deposited, which are soluble in boiling water. When these crystals precipitated from the secretion are moistened with dilute nitric acid, alloxanthine ($C_8H_4N_4O_7$) is produced; and this body treated with warm ammonia, reddish purple murexide or the ammonium purpurate ($C_8H_4(NH_4)N_5O_6$) of Prout is obtained. This murexide so obtained crystallises in prisms, which by reflected light exhibit a splendid green metallic lustre, and by transmitted light they are a deep reddish-purple. On running in a solution of potassium hydrate on to a microscopic slide containing some of these murexide crystals, they were dissolved.

From these reactions it is evident that these rhombic crystals are deposits of uric acid ($C_5H_4N_4O_3$), from the secretion of the green gland of the crayfish. On examining the uric acid crystals (deposited from the secretion by means of alcohol) by means of the microscope, they are seen to be covered more or less with a very thin and superficial coating of some brown colouring matter, probably some urinary pigment.

But, beyond this discovery of uric acid in the secretion of the green gland of *Astacus fluviatilis*, I have found that on treating the secretion with boiling hydrochloric acid, a solution was obtained containing in suspension flaky uric acid, which was filtered off; and, on allowing the filtrate to cool, a few crystals of guanin hydrochlorate ($C_5H_5N_5O$, HCl, H_2O) separate which are soluble in hot water; and on the addition of ammonia to this hot aqueous solution, a precipitate is obtained of guanin ($C_5H_5N_5O$), the precipitated guanin being made up of numbers of minute crystals. On running in warm dilute nitric acid (on to the slide), these crystals disappeared, but were precipitated again on adding a drop of silver nitrate, in the form of the nitrate of silver compound ($C_5H_5N_5O$, $AgNO_3$) of guanin.

I think this investigation proves that this so-called green gland of *Astacus fluviatilis* is a true urinary organ, its secretion containing uric acid and very small traces of the base guanin. So the green gland is physiologically the kidney of the animal; the delicate sac-like body is the bladder, and the small duct between them answers morphologically to the ureter of the higher animals.

In conclusion, I may mention that the crayfishes were obtained from Messrs. Jowett & Co., of Corporation Street, Manchester. I wish here to tender my best thanks to Mr. F. J. Deakin (a pupil of mine in the laboratories of the Technical College, Manchester) for the beautiful photographs he has taken of the microscopic crystals of uric acid and murexide.

MIMULUS LUTEUS.—We have had notification of this plant having been found wild on the banks of the Ribble, near Mytton, by *M. E. A.*

GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

LOUIS AGASSIZ.—The biography of Agassiz, edited by his widow, and lately published by Macmillan, describes the career of a genuine student: of one who struggled into science in spite of serious difficulties; who encountered poverty in consequence of his devotion; who finally overcame all, and by dint of his own moral and intellectual energy rose to a high place among the prophets of Nature.

One of the days that are written in very bright red letters on the tablets of my memory is that which I spent on the Aar Glacier (August 21, 1842), where Agassiz and his merry men were encamped on a great boulder in a hut surmounted with a bold inscription, "Hôtel des Neufchâtelois." They were studying Nature from her own text-book, in the midst of many hardships, which they heartily enjoyed. The great phenomena of glaciers were then but recently revealed, and some of the most important of the revelations were the work of Agassiz on this spot. No less than ten of us, eight tourists and two guides, started from the Hospice of the Grimsel, and invaded his glacier sanctuary rather rudely and unceremoniously (as I now think); but he received us most genially and hospitably, supplying coffee and welcome all round. We were chiefly students with one professor, Pictet—if I understand rightly, the only one of the party previously known to Agassiz.

The most interesting points of the glacier, the glacier tables, cônes, baignoires, trous méridionaux, etc., were visited. We descended a great crévasse to a smoking saloon hewn out of the ice about twenty feet below its surface, and I learned more about glacier details in one day than any amount of reading could supply.

A little incident displayed the earnest enthusiasm of Agassiz. I had come just fresh from attending Jamieson's class on natural history in the University of Edinburgh, the old man having taken up the new and startling doctrine of glacial extension very warmly, in spite of his general conservative tendencies. This had opened my eyes, and, in the course of a walk from Paris to Switzerland, I had made some observations and theories of my own. One of them, which appeared then to be monstrously daring, was that certain mysterious heaps of stones I had seen in the forest of Fontainebleau were moraines of ancient glaciers. I timidly ventured to propound this wild speculation to mine host. He grasped my hand most genially, telling me that he knew them, and was satisfied that I was right, but I must not expect anybody outside of the Hôtel des Neufchâtelois to agree with me: the time had not yet arrived for belief in the full truth of glacier extension.

Remembering this and the impression made upon me by the enthusiastic go-ahead temperament of the

author of "Les Poissons Fossiles," and "Etudes sur les Glaciers," I must "improve the occasion" by a preachment of warning to my readers. Beware of the first symptom of second childhood; the first film which old age spreads over the intellectual vision; that blind conservatism that repels progressive innovation int he region of your own speciality. Louis Agassiz, the great progressive naturalist of fifty years ago, died in darkness, having during his latter years stubbornly shut his eyes against the new light of biological evolution.

SOLIDIFYING GRAVEL-DRIFT.—On sinking the shafts for a coal-mine, many difficulties are encountered. Outsiders commonly suppose that the hardness of the rocks to be penetrated is one of the greatest. This, however, is far from being the case. When the sinkers are going through what they call the "metal," i.e. the hardest rocks of the district, they are paid at a higher rate per yard for their work, but this does not practically increase the cost, as such rock may remain bare, without the ordinary brick lining. Softer shaly rock requires such lining, and in some cases "tubbing" with iron. But the worst of all is loose ground—gravelly deposits which run in from the sides of the sinking, filling up the shaft as the men sink it, and imperilling the whole superstructure of internal brickwork, as the subterranean tower formed by the ordinary lining must necessarily rest on something below. When such running ground is encountered, this internal tower has to be supported by chains or scaffolding, or both, while the battle with the loose ground is fought below at hourly risk of life, until a solid substratum is reached upon which a lower tower is built to reach up to the one that is undermined and suspended.

The same difficulty may be encountered in tunnelling—has been lately in making a tunnel at Stockholm which passes through a hill of light wet gravel. The contractor, Captain Lindmark, has successfully overcome the difficulty by a novel and ingenious device. He employs refrigerating machinery similar to that which is used in supplying us with New Zealand and Australian mutton. With this he converts the wet gravel into solid rock, cuts it accordingly, and while it yet remains frozen builds up the excavated portion with suitable supporting masonry. We are told that "the results have been in every way satisfactory, and already several large houses have been safely passed under." This being the case, but a small step further is necessary in order to apply the same principle in sinking pit-shafts through similar ground.

SEEING THE INVISIBLE.—This apparent paradox has actually been achieved—is in fact now becoming quite easy of achievement; and the invisible objects displayed to sight exist both in the heavens above, and in the earth beneath. Our eyes can only show us the impressions that are made instantaneously on the concave plate of nervous matter which lines the back of the camera-obscura, constituting the forward portion of our organic optical apparatus. But the silver retina at the back of the photographic camera-obscura has the faculty of accumulating the impression it receives; and thus, by long exposure to an object too faint to make a picture *at once*, either on a silver salt, or on the rods and cones of the organic camera, the continuously repeated throbs of otherwise obscure radiations ultimately coincide to produce a visible picture. Stars still fainter than the *debilissima* of Herschel, below the sixteenth magnitude, and beyond the reach of telescopic vision, have been revealed by photography; a nebula in the Pleiades, of which the most powerful telescopes gave no indication, has been discovered, and all have been accurately mapped.

Leaping at a bound from the inconceivably great down to the marvellously small, the photographic retina applied to the eyeplace of the microscope displays markings on the siliceous frustules of Diatomaceæ which the human eye similarly applied is unable to see. Verily a new world is opened out hereby. What mysteries of organic structure may yet be revealed?

PHOTOGRAPHS OF SPEECH.—As an appendix to the above, I may direct attention to a note presented to the Academy of Sciences on January 18, by M. Léon Esquille, who claims to have succeeded, by means of the photophone, in fixing on a photographic plate the modulations of the voice, afterwards reproducing the words by the telephone, and projecting in oxyhydric light the positive image of the plate on Mercadier's selenium receiver. Such is the announcement of this exploit given in "Nature"—vague at present, and liable to the disappointments that have befallen Edison's phonograph, that was very much announced. A little time, however, will show to what extent the expectations thus suggested may be realised.

BOTANICAL COMMUNISM.—At the annual meeting of the Association of German Naturalists, held at Strassburg in September last, a subject of considerable interest to students of natural history was discussed. Several eminent continental botanists agree in affirming that a considerable number of phanerogams, especially forest trees, do not draw their soil food directly from the soil, but are clothed and fed by the agency of an investing layer of fungus-mycelium, to which the name of Mycorhiza has been given.

The investing fungus is not a parasite, properly so called, though it appears to feed upon the rootlets it clothes. There is a mutual dependence, an equitable giving and taking, going on between the root and the fungus—that kind of friendly proceeding known as *symbiosis*. In many of the cases named the coating of fungus completely envelops the root, and is especially well developed at its apex, the thickness

of the fungus often being two or three times as great as that of the epidermis.

Dr. Frank states that all our native oaks, beeches, hornbeams, chestnuts and hazels are covered with a dense cortex of this Mycorhiza, organically associated in growth with the root, completely enveloping it, even to the growing-point. He found it present on every root he examined of trees belonging to the Cupuliferæ, occasionally on Salicaceæ and Coniferæ, but not on woody plants belonging to other natural orders, nor on any herbaceous plant.

Here is a good subject for observation by our amateur naturalists during the coming season, who may be able to communicate some interesting results to this magazine.

Do Snakes swallow their Young?—A very positive confirmatory contribution to this question is supplied in a letter from "A Creole" to "Nature" of January 21. The usual evidence is that of seeing the snake open its mouth and the young enter it, which, considering the rapidity of movement, the smallness of the objects, and the distance at which they are observed (in the case of venomous snakes), is by no means satisfactory, the alternative of taking shelter under the mother being an open one. The writer in "Nature," however, states a case which leaves no possibility of mistake. A snake of the species locally known as the labaria, was killed at Demerara by a coolie; its head cut off and buried, and its body interred in a separate grave, according to the prevailing coolie custom, thereby securing two objects considered very desirable: the first, that no bare-footed bushman shall tread upon the head, and thus be wounded by the poison fangs; and, second, that the head shall not reunite with the body and thereby effect a resurrection! The writer of the letter had the buried body dug up for examination by the coolie that killed and buried it. When disinterred thus, the coolie slashed his old enemy with his cutlass or long knife, when, to the astonishment of the writer, "out through the wound came seven young ones, varying from five to ten inches in length," as roughly estimated. "They were all quite lively, though covered with a sort of thin film of saliva." Several were killed. The body of the parent snake had been buried at a depth of eight or ten inches from sixteen to eighteen hours. A few more observations of this kind would settle the question.

A Domestic Thermometer.—Most of the readers of these Notes are doubtless observers of familiar natural phenomena, and therefore I may venture to direct their attention to a very simple fact that I have long been in the habit of observing as a readily obtainable demonstration of sudden and desirable change of wintry weather. As we all know, the condensation of moisture on the inside of our window-panes is an indication of colder weather outside than inside, and the freezing of this condensed water in feathery crystals is a proof that it is colder still. The converse of this is not so common, though more so than many suppose. I am now writing on February 12, just as a severe frost is going. Early this morning the windows of every room in the house excepting the kitchen were obscured with a dense outside deposit. I was thus able to learn immediately on rising in the morning that the weather had greatly and rapidly changed during the night, by simply looking at my bed-room window.

THE LOWER GREENSANDS, ATHERFIELD, ISLE OF WIGHT.

By C. Parkinson, F.G.S.

The development of the Lower Greensands at Atherfield, as compared with the same formation in Kent and Surrey, is remarkable. Sir Charles Lyell says that the Lower Greensands of Kent measure but three hundred feet in thickness, whereas in the

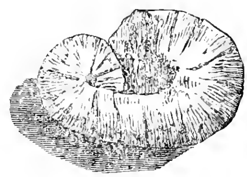


Fig. 44.—*Scaphites æqualis.*

Island they suddenly acquire dimensions of more than eight hundred feet, the intervening distance being barely one hundred miles.* A great deal has been written on this series of rocks by writers of wide reputation, such as Mantell, Fitton, E. Forbes, and others, from which it might be gathered that the characteristic fossils are to be found merely for the trouble of a day's hunting along the beach. The locality has become famous, sections of the cliff have been drawn, and catalogues of mollusca repeatedly published; in spite of this, there is something disappointing to geologists who visit Atherfield; and I have known many cases in which the enthusiastic collector has returned empty-handed, or nearly so, either from inability to find the fossiliferous rocks, or, worse still, having found himself unable to extract specimens from the hard material. The truth is, one single day is insufficient to obtain accurate knowledge of the formation; one requires a week or two in order to get accustomed to the stratification of the district. It may be of service to geologists to give the experiences of an occasional worker among the Atherfield clays. In the first place, it is necessary to indicate the precise locality for studying the best

* "Elements of Geology," p. 293.

sections—that is, between Compton and Blackgang Chines; between these points all the beautiful Atherfield fossils have been found. Hard work is indispensable for extracting organic remains from the rock, some of the concretionary limestones being of the hardest texture. Referring to the monograph of Professor E. Forbes,* on the Atherfield series, it will be found he estimates the thickness of the entire formation at 843 feet, dividing the whole into sixty-three substrata, on account either of their fossil contents or difference in composition. Mantell states† that, although the sections exposed are vertical, they are in an oblique direction to the plane of stratification, and, from the slight angle at which the strata dip to the N.E., the cliffs as far as Blackgang are composed of Greensand deposits.

For full details of the substrata we must refer the reader to the monograph of Professor E. Forbes, and to Dr. Fitton's memoir, "Geological Journal," vol. i., p. 179. Here we can deal only with the fossiliferous bands, which are, after all, those of the greatest interest to the geological student. It is after high tides and heavy seas that the cliffs are most exposed, and it is better to fix a day so that the tide shall be on the ebb during the five or six hours it is is intended to study the rocks. The whole of the Atherfield Greensand is divided into three main divisions, in the lowest of which the fossils chiefly occur. The substrata of the lower section care thus given by Mantell—

(1.) Lowest Greensand clay, brown, 3 feet thick.
(2.) *Perna Mulleti* beds, 2 feet.
(3.) Atherfield clay strata, 100 feet, abound in fossils in lower portion, few in middle, a small species of lobster in upper part. This clay is blue.
(4.) Cracker rocks; beds of sandy clay with two bands of concretionary masses of hard calciferous sandstone.
(5.) Further deposit of blue clays with lobster, etc. (fig. 1).
(6.) Zone of Terebratula, full of fossils.
(7.) Band of Grypheæ and Scaphites.

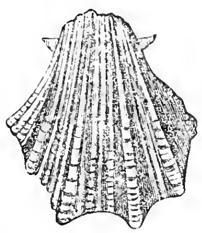


Fig. 45.—*Pecten quinquecostatus.*

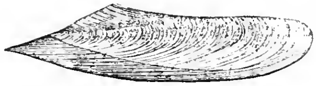


Fig. 46.—*Grevillia anceps.*

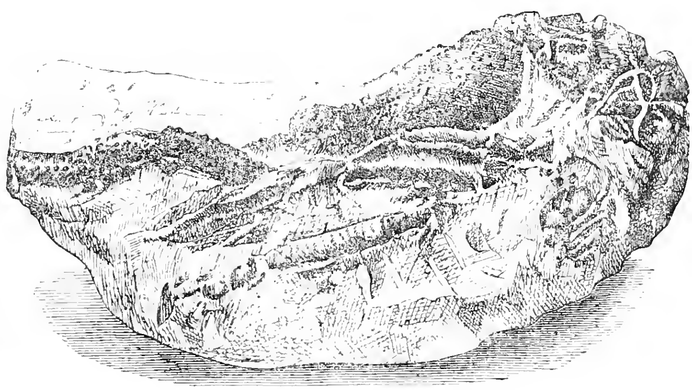


Fig. 47.—*Meyeria Vectensis,* McCoy.

It is in these lower beds the collector must search, leaving the ferruginous sands as entirely unproductive. A large geological hammer and a couple of strong chisels are indispensable; even with these tools it will be found hard work extracting fossils. The best place for descending the cliff is a path a few paces beyond the flag-staff which indicates the coast-guard station; this is indeed almost the only safe place where a descent can be made. Supposing the tide to be receding, it will be advisable to walk a short distance round Atherfield Point to the westward; here we at once see several feet at the base of the cliff of a brown colour, numerous lumps of the same being strewn along the beach; from these lumps well-preserved fossils may be obtained, the section corresponding to Nos. 1 and 2 of the above list.

With regard to the blocks which lie on the beach, I have found that the best fossils are usually visible on the outside; nevertheless, by splitting up such blocks, we frequently obtain different mollusca. *Perna Mulleti* (Desh.) is the characteristic fossil to be met with, excessively difficult to extract on account of the protruding valve, which, in five cases out of six, snaps off. *Gryphea sinuata* abounds everywhere, and is easily obtained; also *Terebratula sella* (Sow.), *Rhynconella* (sp.), *Panopæa plicata* (Sow.), *Corbis corrugata, Venus substriata, Pecten quinquecostatus* (Sow.), *Trigonia caudata* (Agass.), *Trigonia dædalia, Arca Raulini, Nucula scapha, Natica rotundata,* and many other well-preserved shells. In one day I defy anybody to collect even half these fossils; in a fortnight one might procure these and many others. The loose blue clays will easily be identified as we walk eastward from Atherfield Point; here it is that the small lobster, a species of Astacus, is to be found. After rain I have found several specimens lying washed out of the saponaceous clay. Larger Crus-

* Palæont. Soc. † "Geology of the Isle of Wight."

taceans have also been discovered in the upper layers.

The Cracker rocks, so called from the noise the sea causes when dashing against them, are the next series, and are usually the most difficult to identify. From Atherfield Point it is half a mile eastward to the precise spot where we can find this substratum. It consists of two layers of hard nodular calciferous sandstone imbedded in sands and clays, the hard masses usually studded with a profusion of fossils, beautifully preserved, but shockingly difficult to extricate; it requires the strength as well as the weapons of a blacksmith to make any impression on these rocks. On one occasion the writer was fortunate enough to split a large piece of Cracker rock, that one piece alone repaying the trouble and expense of a fourteen-mile drive to reach the coast; in it were a perfect mass of the elongated bivalve *Gervillia anceps* (Desh.); also Solen, *Ammonites Deshayesii* (Seym.), Venus, Thetis, Tornatella, and a fine specimen of Pteroceras, its wing admirably preserved. This mass took two hours' steady hammering before the best fossils were secured; out of a dozen *Gervillia anceps* only one perfect specimen was obtained; as to the other shells, they were taken home in rough blocks, and, after a thorough soaking in water, scraped clean with old pen-knives, etc. It is said 170 species of mollusca have been found in the Atherfield Greensands. The beds in which the celebrated *Scaphites gigas* (D'Orb.) occur are met with at the foot of Ladder Chine, but it depends very much on the state of the beach; the rule is, if the prevailing winds have been east the rocks are exposed; if westerly, the rocks are covered over with shingle, etc. I have never been fortunate enough to hit upon this Scaphite or any large Ammonite, but I have found a large *Nautilus plicatus* (Sow.). Associated with the lowest Perna bed is a thin layer of brown sand, in which are considerable numbers of small bones, vertebræ of fishes; these require remarkably sharp eyes to detect the small fragments. It is astonishing to find such numbers of fossils crowded together in single blocks of stone, as in the Cracker rocks, and I have for some time sought an explanation of this: it may be the sea currents were chiefly instrumental in causing this sort of thing. If we imagine a number of living shells carried along by the force of the ocean tide, till from some local cause, such as rocks, a whirlpool is formed; this eddy will create a small hole in the mud at the sea-bottom, in which the mollusca ultimately get buried in considerable numbers. In course of time such layers of mud become hardened by pressure, and possibly altered by heat. In after ages the mass is upheaved to form the Atherfield cliff, and the puzzled geologist gropes in the dark, finding rock with certain portions crowded with organic remains. Speculation commences; theory after theory is broached; we may be in the right, or we may be wrong; but, as that remarkable man Robert Dick wrote to Hugh Miller, "We must patiently go on collecting facts, and in course of time geology may develop into an accurate science." In that same letter of Dick's is advice which ought to be studied by all geologists; he says, "When I want to know what a rock is, I go to it, I hammer it, I dissect it; then I know what it really is."

With plenty of hard work and perseverance any one may make a fair collection from Atherfield, but it is only by real hard work that this can be done. There are several local fishermen who are competent to act as guides to the stranger, and Mr. Mark Norman, of Ventnor, both knows the Atherfield ground thoroughly and has a fine collection of Atherfield fossils in his possession. Care should be taken when working close under the cliff, as great masses of rock frequently fall without the slightest warning, particularly after heavy rains. It is also dangerous to work on the beach near high tide, for every inch of beach is covered in many places, escape up the perpendicular cliff being impossible. Of the junction of Wealden and Lower Greensand I hope to write at a future time.

The drawing (fig. 47) represents an astaciform crustacean, the original being in the Natural History Museum, South Kensington. Two specimens have been found at Atherfield. It is perhaps the same species as that figured in Professor Bell's monograph,* *Meyeria Vectensis*. Probably further research in this substratum beneath the Cracker rock would add important genera to the Cretaceous fauna. The indications on the exterior of the nodules being exceedingly slight, great care is requisite in developing specimens.

Professor Bell gives the following description of *M. Vectensis:* Carapace very deep, much compressed, the lower sides being nearly perpendicular. The cephalic portion is narrowed forwards, terminated by an acute rostrum. There are on this part seven carinæ, three pairs and one on the median line. The lowest is short, and extends backwards; the next is acute, and, like the former, has small tubercles; the whole surface is granulated; the abdomen compressed, the segments long. The lateral processes are irregularly sculptured and granulated; the legs are long, slender, and compressed, the first pair having small spines. Length of carapace, 2·5 inches, height, 1·2 inches; length of abdomen, 3·5 inches.

It is stated (Palæont. Soc., 1862, p. 34) the species is common at Atherfield. This is apparently an error, the small species of Mantell being evidently confused with the distinct larger form.

This specimen was found about twelve months ago at Atherfield, agreeing with both drawing and description of Professor Bell's.

* Palæont. Soc.

ON ANIMAL BEAUTY.

By Dr. P. Q. Keegan.

A CONCENTRATED individual force, an exaltation of mental, nerve, or animal force, a signal development of forces operating from within upon the animal framework—such, we apprehend, is the principal cause of the beauty of animals. On a piece of shapeless matter forces act either from without or from within. A sculptor hewing a statue is an example of the former; but in the case of all animal and vegetable organisms the forces which determine their shape operate from within, or dynamically. Now, whether we accept the Darwinian hypothesis or not, we may assume that every organism is developed from its conception or birth in accordance with a certain type or exemplar, to which at its maturity it conforms or resembles more or less accurately. When it does conform thereto with exceeding closeness, i.e. when the forces which govern its development have done their work fully, freely, and absolutely, then the result is invariably beautiful. It has been said that "a full development of any force or form is always beautiful"; and this doctrine is based on the hypothesis, that all the originally created specific forms or types or ideals are necessarily beautiful. It is only some constitutional disturbance which produces those "sports" or "variations" which show themselves at each new act of reproduction as part of the phenomenon of heredity, and tend by selective breeding to lay the foundations of what have been styled new species.

There is beauty of form and a beauty of colour; there is a beauty of movement and a beauty of expression. The two former seem to be related to, or to originate from, the material or animal forces; the two latter seem especially connected with forces more strictly mental. The beauty of form, however, i.e. the well-ordered relation of the various parts of the animal frame, seems to constitute the very foundation or indispensable substratum, as it were, of all the other elements of beauty. All animals, even probably some of the very lowest of the Protozoa, exhibit in their ideal conformation an approach to symmetry. The bilateral symmetry of the mammalia, the fish, the insect, is equal in beauty with the radiate symmetry of the star-fish, the sea-anemone, etc. No doubt the perceived similarity of one part of the body to another awakens a sense of beauty, but if the separate parts are not beautiful in themselves, their similarity or well-ordered relationship will not much enhance their attractiveness. The beauty of form arises in the first instance in the perfection of the internal skeleton. Nature, in the creation of the limb, etc., must have done her work thoroughly. The bones must have been nourished with an adequate amount of inorganic pabulum, and have been provided with the full complement of muscles, ligaments, joints, blood-vessels, etc., arranged harmoniously and in the direction corresponding to the particular function which is alloted to them respectively; and, finally, the external covering of skin and of celluloso-adipose tissue must have been so disposed as to ensure the most finished curvilinear beauty of the whole. The primordial elements of every living structure consist of cells, or rather cell-contents, which are endowed with the power of altering and appropriating certain matters in the blood, and of imparting to these matters powers or properties similar to those already possessed by the living structure. These cell-contents or bioplasm originally spring from the single cell or ovum fertilised in the womb, and become as it were distributed among the various cells which constitute the foundations of the structure of the bones, muscles, matrix, fatty tissues, etc. This bioplasm is the seat and principle of the vital energy or force that alone lives, and can change, convert, mould, and form the shape and structure of the body and every portion thereof. It gradually becomes resolved into formed material (the cell-wall) which becomes the seat of physical and chemical change by the operation of the blood-corpuscles thereupon. The original bioplasm, however, seems invested also with the power of causing the elements of matter to take up definite relations towards one another, so that definite compounds may result in the formed tissue, be it bone or fat or muscle, or whatever it be. Now, all that we can proclaim in reference to the beauty of animals as related to their elemental structure is, that where this inherited vital force, resident in the cells of the organism, is signal and individual, and where no external impediment exists to its full, free, and perfect development in harmony with its nature, there beauty is the inevitable result.

In every respect, save that of the ideal type of shape and contour, it may be thought that the lower animals have in the matter now indicated an eminent advantage over man. Man is cramped and swayed by the "conditions of existence," i.e. the conditions of his food, light, air, temperature, etc., and also by the current state of what is termed civilisation, so that infinite varieties of human beauty and of human hideousness are produced. The lower animals, on the other hand, are generally free as the air; and as their life-history knows little check, their vital energy finds free scope and enjoys full swing, so that among the individuals of each species little difference of personal appearance can be discerned. Their nervous system, moreover, not being so acute or sensitive, they are not so subject to disease or to temporary variations of aspect and appearance as human beings are.

No doubt favourable external conditions of exist ence (as food, air, climate, etc.) must foster the

growth and development of the organism in closest accordance with its perfect type or ideal. They unquestionably co-operate with and support the working of the internal forces; but that they are not the sole agencies (as Darwin and the materialists would have it) in the production of this consummate beauty is manifest by a study of our own species. We may aver with great confidence, that no amount of external or material comforts and advantages will alone suffice to render a race or tribe of human beings beautiful or fine-looking. The elements or fundamental principles of animal beauty are seated within the organism, and work from within outwards, not *vice versâ*. This was the doctrine of the ancient Greeks, a people more versed in æsthetic science than any other people before or since. Plato, believing that everything in nature was a copy or embodiment of ideal types or exemplars existing in or before the Divine Mind, expressly maintained that "the type or exemplar of the beautiful shines through its sensible copies more than any other idea does, and that it imparts thereto the highest brilliancy." What causes this brilliant shining through the animal figure is simply the special individual exaltation of the vital forces. These are hereditary, but their energy seems to be immensely stimulated by the lungs. It is in races or individuals who foster humanity and whose lung power is eminently developed that we find the noblest and rarest examples of human beauty.

(*To be continued.*)

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

During March Mercury will be an evening star, setting on the 5th at 6 hr. 27 min., on the 12th at 7.20, on the 19th at 7.58, and on the 28th at 8.10 P.M.

Venus will be a morning star.

Jupiter will rise on the 5th at 7.15 P.M. and set at 7.27 A.M., will rise on the 12th at 6.42 P.M. and set at 6.49 A.M., will rise on the 19th at 6.14 P.M. and set at 6.26 A.M., and on the 26th he will rise at 5.38 P.M. and set at 6 A.M.

Saturn will be due south on the 5th at 7.13 P.M., on the 12th at 6.45 P.M., on the 19th at 6.19 P.M., and on the 26th at 5.52 P.M.

Venus will be at her greatest brilliancy on March 25th.

Mr. Janssen has been writing on the evidence of photographs as to the constitution of sun-spots. His remarks refer to some exquisite photographs which he has taken in 1885. These show the continuation of the granulation of the general solar surface into the spots. He particularly directs attention to a photograph of the great spot of June 22, 1885, in which the bright region which surrounds the penumbra has apparently the same constitution as that of the photosphere in general, being made up of granular elements mostly spherical in shape. The photographs show that the greatly increased brightness in such regions is due to the granules being more numerous, brighter, and arranged on a brighter background. In the penumbra the granulations were less luminous and more scattered, and have dark gaps between the ranks and lines of the granulations which appear like beads on a thread. The bridges across the spots and the masses of luminous matter were also formed of granules, so that it is highly probable that the luminous matter which forms the solar surface has everywhere the same constitution.

In No. 2707 of *Astronomische Nachrichten* there is an article by Dr. Weiss, Director of the Observatory of Vienna, from which it appears that two telescopic comets now visible, namely that of Fabry and that of Barnard, will be seen as very conspicuous objects during the latter half of April and the first half of May. Fabry's comet, when nearest to us—that is to say, about the first half of May—will, it is calculated, attain a brightness 666 times greater than at the date of its discovery on December 1st, 1885. Barnard's comet, about the middle of May, will be 265 times as bright as when it was discovered on December 5th last year. Both these comets will be seen simultaneously, and at the beginning of May they will not be far apart. Their brightness will not increase materially until the beginning of March, after which time their increase of brightness will be both marked and rapid.

The splendour of these two comets will be favoured by the absence of moonlight at the time of their greatest brightness. In the southern hemisphere Fabry's comet will be observed without difficulty up till the end of July, and Barnard's comet up till even a later date.

On March 20th the sun will enter Aries: spring commences at 4 P.M.

The mean temperature of the week ending on January 9th was 3 degrees below the average, and in the week ending the 16th, 2 degrees below the average; while in the week ending the 23rd it fell to 6 degrees below the average; and in the week ending the 30th it was still three and a-half degrees below the average, so that it was the coldest January experienced for many years.

Rain fell on eleven days in January, to the aggregate amount of rather more than one and a-half inches—that is, to nearly 160 tons to the acre.

The average mean temperature of London in March is 42° Fahr. The average rainfall for London in March is only between one inch and two inches, but it averages full two inches at Brighton and some other places to the west of Brighton along the south coast.

OUR SCIENTIFIC DIRECTORY.

[It is our desire to bring out a Scientific Directory in the monthly pages of SCIENCE-GOSSIP, feeling certain that it would be very useful for our readers to know what scientific societies had been formed in their own neighbourhoods. We shall therefore feel very much obliged if Secretaries of any kind of Scientific Society, in any town or part of the country, will send us the full name and title of each Society, together with the names of the President and Hon. Secretary.]

BIRMINGHAM Microscopists' and Naturalists' Union. President, M. C. Beale, C.E.; Hon. Secretaries, Messrs. H. Insley, 15 Mansfield Drive, Mansfield Road, Aston; and P. T. Deakin, 46 Princess Road, Edgbaston.

Bury Natural History Society. President, Rev. Douglas Walmsley; Hon. Secretary, Thomas K. Holden, Blackford Bridge, Bury, Lancashire.

Cirencester Microscopical and Naturalist Society, President, E. J. E. Creese, Esq., F.R.M.S.; Hon. Secretary, Joseph Matthews.

Derbyshire Natural History and Philosophical Society. President, Rev. J. M. Mello, M.A., F.G.S.; Hon. Secretary, Mr. F. Beddow, Normanton Road.

Dorset Natural History and Antiquarian Field Club (established in 1875). President, John Mansel Pleydell, Esq.; Treasurer, Rev. O. P. Cambridge; Secretary, Morton Stuart, Esq.

East London Natural History and Microscopical Society. President, E. I. Lyndall, Esq.; Hon. Secretary, A. Dean, M.Q.M.C., 57 Southborough Road, South Hackney.

El Toro Cycling and Naturalists' Club, Barking Side, Essex. President, J. W. Williams, D.Sc., B.A.; Hon. Secretary, F. W. Halfpenny, F.C.S., 2 Fern Villas, Park Road, West Ham Park, Essex.

Greenhithe Naturalists' and Archæological Society. President, A. B. Farn, Esq., Fair Lome, Stone; Hon. Secretary, Miss S. Martin, 7, The Terrace, Greenhithe.

Highbury Microscopical Society (founded 1878). President, James Smith, F.L.S., F.R.A.S.; Hon. Secretary, Bernard H. Woodward, 80 Petherton Road, N.

Huddersfield Naturalists' Society. President, A. Clark; Hon. Cor. Secretary, Mr. S. L. Mosley, Beaumont Park Museum; Financial Secretary, J. Tindall, 25 Union St.

Leeds Y. M. C. A. Naturalists' Club. President, Mr. E. Hawkesworth.; Hon. Secretary, Mr. Joseph Motley.

Liverpool Microscopical Society. President, Rev. H. H. Higgins; Hon. Secretary, Isaac C. Thompson, Woodstock, Waverley Road, Liverpool.

Metropolitan Scientific Association. President, J. D. Hardy, F.R.M.S.; Secretary, Grenville A. J. Cole, F.G.S. Meetings, second Tuesday in the month at 7 p.m.; City of London College.

New Cross Microscopical and Natural History Society (instituted 1872). President, W. J. Spratling, B.Sc., F.G.S.; Hon. Secretaries, M. J. Lindsey, jun., and L. M. Biden, 11 Leadenhall Street, E.C.

Sidcup Literary and Scientific Society. President, W. Law Bros; Hon. Secretaries, T. S. Stacy and W. Short.

South London Microscopical and Natural History Club, Brixton Hall, Acre Lane. President, T. Sebastian Davis, F.C.S., F.R.M.S.; Hon. Secretaries, Henry Groves and Robert Briant.

Tunbridge Wells Natural History and Antiquarian Society, Pantiles, Tunbridge Wells. President, R. Norton, Esq., M.P.; Hon. Secretary, Geo. Abbott, M.R.C.S.

Youth Scientific and Literary Society of London. Hon. Presidents, Prof. H. A. Nicholson, M.D., D.Sc., F.R.S.E.; Dr. J. E. Taylor, F.L.S.; Thomas Edward, A.L.S.; President, Alex. Ramsay, F.G.S., F.R.G.S.; Vice-Presidents, J. W. Williams. D.Sc., B.A.; Rupert Garry, F.S.Sc.; Hon. Secretary, R. A. Neville Lynn, 42, Chalcot Crescent, Regents Park, N.W.

SCIENCE-GOSSIP.

THE water-plaintain is used in Russia as a remedy for hydrophobia. The roots are dried and grated, then spread on bread and butter, and a good dose taken night and morning. Two or three doses are said to be sufficient to effect a cure.

THE old-fashioned theory about the formation of dew, originated by Dr. Wells, has received a severe attack from Mr. John Aitkin, the distinguished physicist, who has just read a paper before the Royal Society of Edinburgh in which he contends that dew does rise, and that it is not distilled from the surrounding atmosphere. From experiment he concludes that the dew rises as vapour from the ground. The ground was found to be actually hotter than the air above it; and Mr. Aitkin thinks that so long as the excess is sufficient to keep the temperature of the surface of the ground above the dew-point of the air, it will, if moist, give off vapour; and that it will be this rising vapour which will condense on the grass and form dew. But this theory will hardly explain why dew is generally formed on the upper surface of leaves, instead of the *lower.* If it always came from the ground, it ought to form on the lower surfaces of leaves rather than the upper. That the moist soil gives off vapour no one doubts; but is this fact sufficient to establish a new theory of dew?

A BILL to propagate a contagious disease among rabbits, with a view to exterminate them, is to be introduced into the South Australian Assembly. The experiment is to be tried on Torrens Island.

A WOMAN of fashion recently ordered a dress to be trimmed with canaries!

DURING one week in January many thousands of larks were snared on Royston Heath, and no less than 8 cwt. sent to the London market from Royston Station within a few days.

ON the 11th ult., Dr. J. E. Taylor, editor of SCIENCE-GOSSIP, lectured at the Chelmsford Museum on "The Natural History of Dust"; and on the 15th, before the Hitchin Scientific Society, on "Carnivorous Plants."

THE "Journal of Anatomy and Physiology" has a very able paper by Dr. Alexander M. M'Aldowie, on "The Development and the Decay of the Pigment Layer on Birds' Eggs."

THE "Journal of Microscopy and Natural Science" for January contains, besides the President's address, papers on "The Mouth-organs and other characteristics of the British ground predaceous Beetles," "Freshwater Algæ," "The Microscope, and how to use it"; besides "Half-hours with Mr. Tuffen West," "Notes from the Postal Society's books," etc. The lithographical illustrations are all excellent.

THE "Scientific Enquirer," No. 1 of which appeared in February, is another proof of the large and increasing interest taken in natural history literature. It is edited by Mr. Alfred Allen, and professes to be a monthly medium for the supply of information on all scientific subjects. Consequently there can be no complaint as to the narrowness of the field intended to be cultivated!

MR. E. T. DRAPER, whose charming microscopical illustrations will not soon be forgotten by readers of SCIENCE-GOSSIP, is continuing the papers from the 1st of March, price one shilling, but containing two plates drawn from nature, with descriptive text. They will be published by the author at 11 Palace Road, Middle Lane, Crouch End, London, N.

THE Annual Report of the Hemel Hempsted Natural History Society for 1885 is to hand, containing papers on "Blue Mould," by Mr. W. G. Smith; "Characeæ of the Midlands," by Mr. John Saunders; a catalogue of the British plants in the Society's Museum, etc. etc.

THE Annual Report of the Huddersfield Naturalists' Society for 1885 (established in 1847) shows an active and vital state of things. The disposition of officers in this society is admirable, and might be copied with advantage by others. Thus, in addition to the usual list, it has a curator, librarian, seven members who form a sub-committee for a botanic garden, and three who act as recorders in botany, fungology, and entomology.

AN unpretending but useful little journal is the "Natural History Teacher," conducted by Mr. S. L. Mosley, the lecturer on natural history in the Huddersfield Board Schools. Every one knows what a hold natural history has on the working classes of the north, in some form or another, and Mr. Mosley is doing good work by giving it a scientific direction among the young.

"CHANGES in Land and Sea" is the title of a capital article in the "Hull Quarterly" by Mr. C. S. Whiting. It gives an account of the marine denudations which are going on along the eastern coast.

IN the Transactions of the Seismological Society of Japan, there is an elaborate paper of eighty-two pages, by Professor Milne, giving the details of his admirable series of experiments and observations on earthquakes.

THE last number of the "Proceedings of the Folkestone Natural History Society" contains the papers read. Among them is one on "Development," on which there is a capital and good-tempered discussion reported.

THE Sidcup Literary and Scientific Society publish their Annual Report, in which there are some excellent papers on "Varieties of Life," "Colour," "The use of the Microscope in Geology," "The Dispersal of Seeds," "Detection by the Microscope of Adulteration in Food," "The Bexley Deneholes," etc.

MICROSCOPY.

COLOSSAL AMŒBA.—Observing that Mr. Brayley's query, as to a colossal Amœba which he found, remains unanswered, I would advise him to consult Prantl and Vine's "Botany," where I think he will find a similar organism described as the compound plasmodium of one of the Myxomycetes. Saville Kent also describes this form: *vide* "Manual of the Infusoria," pp. 41 and 42.—*E. C. Bousfield, L.R.C.P.*

ZINC CEMENT.—I have been using white zinc cement lately for finishing off slides, but somehow it doesn't harden properly or become white, as it should do. Would some reader kindly give me a hint on the subject?—*W. M. Ranson.*

THE LATE MR. J. B. JEAFFRESON.—We record with the deepest regret the death, on January 12th, of Mr. J. B. Jeaffreson, M.R.C.S. He came of a family distinguished for many generations in the medical profession, having worthily followed his father and grandfather in Islington, and he will be succeeded by his eldest son, who is on the eve of completing his studies. Mr. Jeaffreson had been for many years one of the most active members of the

Highbury Microscopical Society, and was its president in 1884. He had contributed many papers, chiefly biological. He was much beloved on account of his kindly, genial manners, and readiness to help others with his knowledge, being well read in most branches of natural history and having a remarkably retentive memory; and so, being always on the look out for recruits, had enlisted many young men in the cause of science. He was preparing a paper on "Mites" for a meeting to be held next November by the Highbury Microscopical Society, and had already mounted many slides for that purpose. He was interred at Highgate on January 16th, when many friends, including most of the medical men of the district, assembled to do him honour.

THE QUEKETT MICROSCOPICAL CLUB.—The last issue of the journal of this flourishing society contains the following papers: President's inaugural address, by A. D. Michael, F.L.S.; "Notes on *Palmadactylon subramosum*, and on a new British species of Vaucheria," by Dr. M. C. Cooke; "On an unusual form of tube made by *Melicerta ringens*," by T. Spencer Smithson; "Historic Microscopy," by E. M. Nelson; "On a method of equalising the thickness of slips when raising an oil immersion condenser," by E. M. Nelson; "Final notes on the so-called desiccation of Rotifers," by Henry Davis; "Corrigenda to Professor Cleve's paper 'On some fossil marine Diatoms'"; etc. etc.

COLE'S "STUDIES IN MICROSCOPICAL SCIENCE."—The last four parts of this ever-welcome work, as usual cover various parts of biological ground. All are illustrated by artistically coloured plates. Thus, botanical histology deals with the structure of the sexual organs of reproduction in the angiosperms; animal histology with the disposition of the organs in the invertebrata; pathological histology with Collier's disease (anthracosis); whilst the part devoted to popular microscopical studies gives an account of *Trichina spiralis*. The slides accompanying the above four parts present us with (1) a transverse section of the mature ovary of Lilium, (2) transverse section of young lamprey, (3) a slide showing anthracosis of coal-miner's lung, and (4) a diatom (*Cestodiscus superbus*).

NEW SLIDES.—We have been favoured with an admirably mounted set of slides, of *Trichina spiralis*, by Mr. Ernest Hinton. No. 1 shows male and female; No. 2, the worm imbedded in the muscle; No. 3, ditto (larva) dissected from muscle, and freed from surrounding material; No. 4, Trichina in capsules; and No. 5, ditto calcined in the muscle. All of them are of the highest use both to teacher and student. From Mr. B. Piffard we have received several slides of botanical specimens, some of them stained by his new process of iodine vapour. Among them are vertical sections of leaf of carnation, showing stomata; the dodder (Cuscuta) with its tissues imbedded in the host-plant; Hyphæ of fungi, etc. Mr. C. Collins, jun., has forwarded us a well-mounted and valuable slide of the much-debated "Dawn animalcule" (*Eozoon Canadense*) from the Laurentian rocks. If there is no royal road to knowledge, it is very certain that such available aids as the above make the path both easier and pleasanter for the student.

THE ROYAL MICROSCOPICAL SOCIETY.—At a meeting of the above society, Dr. Dallinger, who has been re-elected president, delivered the annual address. Dr. Dallinger dealt in his opening remarks with the growth of specialisation in science. This, he thought, was at once a triumph and a peril. The autonomy of the expert and the specialist was a danger that all who care for the unity and wholeness of human knowledge must be alive to. Dr. Dallinger indicated the remedy as lying in the improvement of scientific education so as to secure breadth of culture, and the careful linking of each small and special area of research to, and viewing it in the light of, the inconceivably vaster realm in which it was an essential and inalienable factor. The special subject of the address was an example of this connection; it dealt with a problem which lies at the base of all biology—the importance of the cell-nucleus. The address was a masterly one. After giving similar details about several organisms, Dr. Dallinger summed up thus: "One thing appears clear—the nucleus is the centre of all the higher activities in these organisms. The germ itself appears to be but an undeveloped nucleus; and when that nucleus has attained its full dimensions, there is a pause in growth, in order that its internal development may be accomplished. It becomes practically indisputable that the body-sarcode is, so to speak, a secretion, a vital product of the nucleus. From it the flagella originally arise; by it the act of fission is initiated and in all probability carried to the end; the same is the case with fertilisation and the production of germs. We are thus brought into close relation with the behaviour of the nucleus in the simplest condition. No doubt far profounder and subtler changes are concurrently proceeding. We of course are no nearer to the solution of what life is. But to come any distance nearer to a knowledge of how the most living part of the minutest organisms acts in detail has for me and for most biologists an increasing fascination." The address was illustrated by original pictures of great beauty thrown upon a screen by a powerful oxy-hydrogen microscope, and was greeted with loud applause at its conclusion.

THE "Journal of the Royal Microscopical Society" for February contains a paper by Mr. A. W. Bennett, F.L.S., "On the Freshwater Algæ of the Lake District;" "The Preparation of Sections of Pumice-stone and other Vesicular Rocks," by Dr.

H. J. Johnston-Lavis; "On the Cultivation of Bacteria," by Dr. E. M. Crookshank; "The Appearances of Micro-organisms as exemplified by the Microbe of Chicken Cholera," by Mr. G. F. Dowdeswell; "The 'Central' Light in Resolution," by Mr. J. W. Stephenson; besides which we have the usual able and copious summary of current biological researches.

ZOOLOGY.

Variations in Molluscs.—In an able article published in the "Zoologist," Mr. B. B. Woodward, F.G.S., enters a strong protest against the tendency to "variety-mongering" and variety-naming which is, unfortunately, so much in vogue. It is quite a scientific operation to observe and note the differences in common species. Mr. Woodward remarks as follows: "Surely the state of our knowledge is sufficiently advanced to allow of certain variations being admitted as normal, so to speak, to every species, *e.g.*, unusually fine specimens, dwarfed forms, reversed examples, scalariform individuals, and albinos, without its being necessary to distinguish each one by a different varietal or 'monstial' name. It should be enough to record their existence, and that of such variations as are more or less specific, *i.e.*, those of colour, markings, etc. In short, I would advocate the adoption of the method followed by Gray."

New Variety of Unio tumidus.—It may interest some of your conchological readers to know that I have obtained, from the fish-pond at Wistow Hall, near Leicester, a variety of *U. tumidus*, which Mr. J. W. Taylor of Leeds has named for me: *U. tumidus*, var. *ponderosa*, Pascal. Mr. Taylor remarks, "This variety has not, I believe, been published as British."—*H. E. Quilter, Leicester.*

Arrenurus.—On August 3rd, 1885, I found a male Arrenurus, differing greatly from any I have before described, and also differing from any of the figures in Müller or Koch. It was of a lemon colour, with brownish cornu. The eyes were of a beautiful crimson, and the legs transparent blue; the central projection from the tail resembles the same part in *A. viridis*, but the colour is yellow. The mite differs from this latter in size as well as in colour, and also in the shape of the rest of the tail. The spur on the last joint but two of the hind leg is large. After the creature was killed, and prepared for mounting, it was seen that the colour was entirely dependent on the contents of the abdomen, the chitinous skeleton being of the same blue as the legs during life. When viewed as an opaque object there was a green shade seen occasionally, evidently produced by the yellow colour passing through this transparent blue of the exoskeleton. If this creature has not been before described or named, I should feel disposed to call it *Arrenurus luteus*. It will be well to remember that Koch says, "*A. calcaratus* has the central part of the tail yellow"; his figure, however, I think, differs from the mite now described.—*C. F. George, Kirton-in-Lindsey.*

Bulimus obscurus.—It may be of interest to note the occurrence of this shell in the Channel Isles. Jeffreys, I believe, gives Devonshire as its southernmost limit; last September I took two live specimens near the walls of Fort George in Guernsey. It is only surprising that it has not turned up there before. It does not occur in Cooke and Gwatkin's list in 1878. Its continental range is of course most extensive—according to Clessin, from Sicily to St. Petersburg. On the other hand, *Bulimus montanus*, Drap., does not seem to cross the Alps, though it occurs as far south as the neighbourhood of the Pyrenees, and, I think, on the Spanish side. Another curious point about it is that, while not occurring in Denmark, it appears again in the north of Sweden.—*Brockton Tomlin.*

BOTANY.

Cardamine pratensis, viviparous.—Mr. John Taylor (Note on Floral Varieties, p. 20, Science-Gossip) will find the following about *C. pratensis*, ladies' smock, or cuckoo-flower, being reproduced by buds, such as he describes, in Thome's "Botany," p. 83: "The bodies termed bulbils or gemmæ, are stem-buds, which detach themselves from the plant, and can themselves give rise to new individuals exactly like the parent. They are found, for instance, in abundance on certain species of Allium, on the leaves of *Cardamine pratensis*, &c." I have several times found the leaves with the little plants growing out of them—a peculiarity which is not noted in any of the modern Floras that I am acquainted with, while it is given in Smith's "English Flora," vol. iii. p. 190, London, 1825: "Radial leaves, several, &c., sometimes viviparous." It is a pity that so much of the interesting matter that is only to be found in those dear old volumes of Withering and Smith has been removed from recent handbooks: it was attractive and most helpful to those who wished not merely to classify their plants, but to know all about them. I would add that the seed-pods of *Cardamine pratensis* are seldom perfected, the plan of reproduction from the leaves is provided by the Creator, that it may be fruitful and multiply. Another instance of a gemmiparous plant is Utricularia, where also seed-vessels very rarely come to perfection, while the perpetuation of the race is provided for by the terminal buds, which last throughout the winter, when the old plants decay away.—*H. W. Lett, M.A.*

PRIMROSES AND CATTLE.—While turning over the pages of Withering's "British Plants," London, 1801, since I wrote my query at p. 20 of SCIENCE-GOSSIP, I found at p. 229 of vol. ii. the following corroboration of my experience as to sheep and goats eating primroses: "Sheep and goats eat it, cows are not fond of it, horses and swine refuse it.—LINN." Here we have the great Linnæus saying the very opposite to Dr. Spencer Thompson. Some of your readers might give the *ipsissima verba* of the Swede. *H. W. Lett, M.A.*

LOCALITIES FOR DIANTHUS ARMERIA.—Twelve years ago I knew two localities for *D. armeria* near Castletown, in the Isle of Man. One of them was in a field adjoining the grounds of King William's College, the other near Ballasalla. The former spot, however, when I revisited it in 1880, had been converted into the site of a new chapel for King William's, and I fear all traces of the plant there perished. I hope that it may survive in the second locality, but the island is so ransacked by tourists in summer that the existence of any botanical curiosity is mournfully precarious.—*C. B. Moffat.*

PLANTS FROM THE ISLE OF WIGHT.—Of the plants mentioned by Mr. Parkinson (p. 45), *Ornithogalum umbellatum* and *Polemonium cæruleum* have been recorded before, and are both probably, the latter certainly, the remains or escapes of cultivation. *Epipactis*, or, as it is now usually named, *Cephalanthera ensifolia*, has never been authentically recorded as found in the Island, and the locality, "woods of the Undercliff," does not strike one as being at all a likely one. This species, unlike *C. grandiflora*, is decidedly rare on the mainland of Hants, and I have never seen it or heard of it, except in beech woods on the chalk. I cannot help suspecting that some other plant has been mistaken for it, perhaps *E. palustris.* —*F. I. Warner, F.L.S.*

GEOLOGY, &c.

BONE CAVES IN NORTH WALES.—Dr. Hicks and Mr. W. Davies have just given the results of researches carried on in these caverns in the summers of 1883, 1884, and 1885 by Mr. E. Bouverie Luxmoore, of St. Asaph, to the Geological Society. The enormous collection of bones belonging to the now extinct animals of Pleistocene age obtained had been submitted for examination to Mr. W. Davies, and afterwards distributed to various museums. Several well-worked flint implements were also discovered in association with the bones. The following are the conclusions arrived at from the facts obtained during the explorations:—That abundant evidence has been furnished to show that the caverns had been occupied by hyænas, and possibly by other beasts of prey, as dens, into which portions of carcasses of various animals had been conveyed in Pleistocene times. The very great abundance of some animals, such as the rhinoceros, horse, and reindeer, and the frequent presence of bones belonging to young animals, proved that the plain of the Vale of Clwyd, with that extending northward under the Irish Sea, must have formed a favourite feeding-ground even at that time. The flint implements and worked bones showed also that man was contemporary with these animals. The ravine in which the caverns occur must have been scooped previous to the deposition in it of the glacial sands and Boulder-clays. This sand and clay, there seems good evidence to show, must have filled up the ravine to a height above the entrances to the caverns, and such sands and clays are now found at some points to completely fill up the caverns. The following seem to Dr. Hicks to be the changes indicated by the deposits. The lowest in the caverns, consisting almost entirely of local materials, must have been introduced by a river which flowed in the valley at a very much higher level than does the little stream at present. Gradually, as the valley was being excavated, and the caverns were above the reach of floods, hyænas and other beasts of prey occupied them, and conveyed the remains of other animals into them. Man also must have been present at some part of this period. Gradually the land became depressed, the animals disappeared, stalagmite was formed, and the sea at last entered the caverns, filling them up with sands and pebbles, and burying also the remains not washed out. Floating ice deposited in this sea the fragments of rocks derived from northern sources, and these became mixed with local rocks and clays brought down from surrounding areas. The greater part of the Boulder-clay in the Vale of Clwyd was probably deposited as the land was being raised out of this mid-glacial sea. During the process of elevation the caverns became again disturbed by marine action and the upper fine reddish loam and the laminated clays were deposited. It seemed impossible to avoid the conclusion, that these caverns must have been submerged, and afterwards elevated to their present height of about 400 feet above the level of the sea, since they were occupied by Palæolithic man and the Pleistocene animals.

BRITISH PETROGRAPHY.—We are pleased to notice the appearance of the first part (price 3*s.*) of a work which has long been required, and which every month it becomes more imperative to supply—Mr. J. J. Harris Teall's Monograph on the ordinary rocks of the British Islands. Every one interested in the study of rocks will be glad to subscribe to this invaluable work, particularly as nobody is better capable of bringing it out than Mr. Teall. The first part contains two exquisitely got-up coloured plates, with key-plates (by Messrs. Watson, of Birmingham), and they and the text deal with Lherzolite, Serpentine, Picrite, etc.

NOTES AND QUERIES.

JACKDAWS.—The following facts seem of sufficient interest to obtain a place in your ornithological notes. A friend of mine is in possession of a jackdaw, which was taken as a nestling from the nest in the summer of 1874 from Hadleigh Castle in Essex; it has been reared in a cage ever since, and has become tame enough to go about the room, and the garden, but is always very spiteful to strangers. It was always believed to be a male bird; as it had till this year never laid an egg. On one occasion last spring, some time between May 24 and June 23, on cleaning out the cage, my friend noticed some yelk of an egg, and a few days afterwards she observed the bird to be sitting about in an unusual manner, and the next morning, a Saturday, she found an egg; and on the succeeding Monday, she found a second one. I give measurements of one egg: greatest length $1\frac{3}{16}$ inch; greatest width $\frac{15}{16}$ inch. Since then the bird has laid no more eggs. The bird has been constantly in the care of the same person, so that it would be impossible for any previous laying, if such had occurred, to have escaped her observation. I should be glad to know whether such an occurrence as I have described is unusual or not.—*Herbert Taylor.*

THE WATER-OUZEL.—Your correspondent F. Burman, on p. 262, is quite right in his remarks on the water-ouzel. I have written on the same subject myself in much the same strain, and if he will get "Oology," vol. i. page 78, Sir William Jardine, that practical naturalist, says: "For the ova of *any kind* of fish we have *never* detected in their stomachs or intestines; and we deem it almost impossible that they could reach it after it was impregnated and *covered* in the spawning bed."

ACCIDENTS TO BIRDS.—It may be interesting to many readers of SCIENCE-GOSSIP, as also serviceable to any who have birds which they prize, to know that I have been most successful in setting a broken leg. The particulars are briefly these. A young lark, which I have reared from the nest this year, accidentally broke its leg. For a week I looked upon it as a sprain, but, as the lameness did not improve, but grew worse, I examined the leg more attentively, and found that the tarsus-bone was broken high up and just below the ankle, which is commonly mistaken for the knee. With the lustre of the eyes gone and the feathers wet and matted together—probably from perspiration occasioned by the pain—it looked a pitiable object. I doubted if I could save its life. I resolved to try the experiment to set the bone; so, with the assistance of a second person, I cut a piece of thin post-card, and, having damped it, I folded it round the leg from the ankle to the foot, allowing the edges to just lap over. I then firmly bound a considerable amount of darning worsted round the card splint, and put the bird back into its cage. This I did about three weeks ago, and it is now so far better that it can open its claws and put its leg down to steady itself. Before I put this splint on, the leg, which was very hot and red and slightly swollen, was drawn up and the claws folded into a ball, while it supported itself by dropping its wing. I hope very soon to have the satisfaction of seeing it quite well.—*Walter T. Cooper.*

THE VIOLET QUOTATION.—In the course of my reading I have come across two passages containing the same idea, namely, an expressed desire that the violet should grow out of the ashes of a dead person. I cannot find a note, in any annotated edition which I possess of either work, which gives any reason for the birth of such an idea, and am in doubt whether it is merely the result of chance that two authors should have fixed upon the same flower—the violet—to mention in connection with the burial of a corpse; or whether there is some tradition, or a natural peculiarity of choice of locality connected with that flower, which would lead one to expect its appearance on a grave. One of these passages is from "Hamlet," act v. scene 1:—

> "Lay her i' the earth,
> And from her fair and unpolluted flesh
> May violets spring."

The other is from "In Memoriam," canto xviii.:—

> "We may stand
> Where he in English earth is laid;
> And from his ashes may be made
> The violets of his native land."

Perhaps some of your readers may be able to aid me with a satisfactory elucidation.—*P. Q. Learite.*

MEAN TEMPERATURE AND RAINFALL.—I feel obliged to Mr. Mattieu Williams for his courteous reference in last year's SCIENCE-GOSSIP, p. 269, to my paper on the Sequence of Mean Temperature and Rainfall. I beg leave to point out two verbal errors (possibly printers' errors) which should be corrected, for the sake of any of your readers who may be inclined to follow out this interesting subject. 1. Instead of "It is very rarely that a dry August is followed by a wet September," there was shown to be a strong probability for a *very dry* August to be followed by a "more or less wet September." This is remarkable as being the only instance in which a tendency towards opposition between one month and the next, and between one season and the next, is found to exist, whether as regards their temperature or their rainfall. 2. When either of the months, April, June, July, August, September, December, or January, is very cold, the succeeding month tends to be *cold*, not, as stated, a "dry one."—*H. Courtenay Fox, M.R.C.S., F.R.M.S.*

ARSENIC AND MALARIA.—Whatever may be the virtues possessed by Eucalyptus as a protective against malaria, Dr. Tommasi-Crudelli is certainly right in advocating the use of arsenic. As an employé at the Cornwall Arsenic Company's works at Bissoe for nearly forty years, I have had every opportunity for making observations on this subject. During that time I have never known a single case of cholera or any other zymotic disease to occur in that part of the valley where these extensive works are situated. When the cholera, fever, smallpox, &c., have visited the county, many cases have occurred in the same valley two miles below the works and the same distance above it, but I have never known a single case nearer the source of these deadly fumes.—*Stephen H. Davey, Ponsanooth, Cornwall.*

LUNAR RAINBOWS.—It has been said, "that man is fortunate who has seen more than three lunar rainbows during his lifetime." If this be true, I have been favoured in this matter beyond the ordinary race of mortals. During thirty years I have seen fifteen. Referring to my meteorological note-book, I find three of more than ordinary brightness: Dec. 22nd, 1868; Sept. 6th, 1870, and Sept. 27th, 1885. The last was the most brilliant I have ever seen; it was not only large, but of uniform brightness throughout. There were two others the same night, but not so perfect as the first. Night rainbows are

by no means of common occurrence, but Louis Jarman may rest assured they are not so rare as is generally supposed.—*Stephen H. Davey, Ponsanooth, Cornwall.*

The Electrical Eel.—I was much interested, on looking through the current number of Science-Gossip, to see a fact recorded by Professor du Bois Reymond which I have never seen in print before, but which I observed myself a few years since; namely, the power the electrical eel possesses of delivering its blow without actual contact with the object struck. I have seen it stated that no shock can be delivered unless the eel is touching the object in two places so as to complete the circle, but, so far from this being the case I have no doubt the eel can send the shock through several inches of water. The last time Frank Buckland was at Southport, we were examining the various creatures in the Aquarium, and among others some fine electric eels. We wanted to try whether the shock was fatal to a fish of a size suitable for food for the creature, or whether it was only stunned. We therefore put a fine roach into the tank. The eels became much excited, and one big fellow sailed alongside and delivered its shock. The roach instantly turned belly up without even a quiver of its fins; but what struck us both was that the eel was certainly several inches off the fish when the latter was struck. We repeated the experiment with another roach and another eel, watching carefully to see the exact distance, and were both satisfied that the eel was at least three or four inches distant. We could not get another experiment, as the eels would not use their power, or else had exhausted it. Buckland was highly pleased, but did not want to say anything about it without trying again to ascertain more about it if possible, expecting very soon to have an opportunity of verifying the observations. His illness, and the death of the eels shortly after, prevented the further observations being made. I do not profess to be an electrician, but I cannot understand how the shock can be sent through several inches of water, which we were both convinced it was. The two unfortunate roach, though so completely paralysed as not to exhibit the slightest sign of life, both recovered, having been removed from the tank before the eels could seize them. These creatures proved to be, like many other fishes, cannibals. We had three in the tank, one rather smaller than the others. One day the smallest was missing, and the bloated appearance of one of his companions showed only too clearly what had become of him.—*Charles L. Jackson, F.L.S., F.R.M.S., &c., Honorary Naturalist to the Southport Aquarium.*

"The Shard-borne Beetle" of Shakespeare is in all probability *Geotrupes stercorarius*, the large dung-beetle. It flies very much in warm weather in search of dung, through which it bores, and deposits its eggs. Not unfrequently it flops into our faces in the dusk in rather a startling manner. Some people have thought the poet meant the cockchafer (*Melolontha vulgaris*); but the other insect is certainly more obtrusive and, in most British localities, more abundant, and therefore more probably intended.—*Rev. W. C. Hey.*

The Shard-borne Beetle.—"The shard-borne beetle, with its drowsy hum," is evidently meant for one of the "Dor" beetles, *G. vernalis* most probably, they being the ungainly, dignified gentry that fly in all our country lanes on a summer's evening, and so thoroughly ignore the presence of any intruder on their happy hunting-ground as to think it unworthy of their dignity to get out of the way, and endeavour to fly through them or knock them over.—*Louis Jarman.*

Mimulus luteus.—In August, 1885, I also found the above plant growing in a stream (Whittey Brook), in the village of Stockton, near here. It covered the stream for a mile or more.—*William Weaver.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

We request that all exchanges may be signed with name (or initials) and full address at the end.

H. E. Quilter.—We shall be glad to hear from you on the subject you mention.

T. W. M.—Dr. McNicol, of Southport, has published a "Glossary of Natural History Terms." A cheaper book, however, is Rossiter's "Dictionary of Scientific Terms," published by Messrs. William Collins and Sons, Publishers, London and Glasgow.

H. P. M.—We are sorry to say your box of shells never reached us. Your note is the first we have heard of them.

W. Hambrough.—Your specimens are unquestionably the eggs of some lepidopterous insect, the species of which we wil ascertain for you.

G. Forbes.—Stark's "British Mosses," and Lindsay's "British Lichens," each price 10*s.* 6*d.*, are the best you could get. You may get them second hand, very likely, of Mr. W. Collins, Scientific Bookseller, 157, Great Portland Street, London, W.

A. S.—Stark's "British Mosses" (price 10*s.* 6*d.*), with beautiful coloured plates, will admirably meet all your requirements. See also article in Science-Gossip, vol. 1872, on "Collecting and Preserving British Mosses."

P. E. G.—Mr. John E. Robson, Hartlepool, has published a book of labels for British plants, with space for filling up such as you require; price, we believe, 4*s.* 6*d.*

W. Smith.—The "Torrey Bulletin," published in Indianapolis, deals with American Cryptogama.

EXCHANGES.

Wanted, a good breech-loading double-barrelled gun, any gauge between 12 and 16, either pin or central fire; 16 pin-fire preferred. Will give in exchange collection of eggs, 100 species, also a few skins and books. Apply for list to C. Forge, South Sea Farm, Flamboro', Yorkshire.

A few good specimens of *Unio tumidus*, var. *ponderosa*, Pascal (new British variety), *U. pictorum*, var. *rostrata*, Lam., and *Anodonta cygnea*, var. *Zellensis*, for exchange.—H. E. Quilter, 4 Cedar Road, Leicester.

Wanted, a clean copy of "Forms of Water," by J. Tyndall, vol. i., or "The Crayfish," by T. H. Huxley, vol. xxviii., or "Volcanoes," by John W. Judd, vol. xxxv. (International Scientific Series), crown 8vo, cloth, price 5*s.* each, in exchange for "The Doctrine of Descent and Darwinism," by Professor Oscar Smidt, vol. xii., same series, price 5*s.*—T. Fielding, Constable's Tower, Dover, Kent.

A Williams freezing and imbedding microtome, by Swift & Son, for good high-power objective or other offers.—W. Jenkinson, 9 Surrey Street, Sheffield.

Wanted, to exchange good typical Liassic specimens from the Midland counties for similar specimens from other districts. —W. D. Crick, 7 Alfred Street, Northampton.

Wanted, parasites and their eggs, either mounted or unmounted, in exchange for good slides and objects.—J. W. Wilshaw, 455, Shoreham Street, Sheffield.

Wanted, vols. i. and ii. of "Proceedings of Geologists' Association."—B. H. Woodward, 80 Petherton Road, London, N.

Fertile eggs of Dispar from fem. 2½ inches across, to exchange for fertile eggs of Caja, Villica, and Ulmata.—L. Jarman, 304 High Holborn, London.

Well-mounted micro-slides to exchange for other good micro or lantern slides.—Dr. Moorhead, Cootehill, Ireland.

Balsam-mounted sections, well finished, for pathological or histological specimens suitable for sections in chromic acid or spirit.—Thomas Groves, Kilburn Dispensary, N.W.

Aquarium, octagon form, 20 inches high, 15 inches wide, slate bottom; open to offers—no books. Also, Cassell's "Science for All," complete, unbound; desiderata, aviary, cage, or good canaries, or other birds other than pigeons or fowls.—Aquarium, 24 Park Road, Clapham, London, S.W.

Wanted, ¼-inch objective, or other microscopic appliances, in exchange for 100 accurately-named British mosses.—G. A. Barker, 1 Northwold Road, Upper Clapton, E.

"Lancashire and Cheshire, Past and Present" (Bains and Fairbairn), 25 parts, published at 3*s.* each, one part missing. What offers?—J. Laing, 37 Main Street, Stapenhill, Burton-on-Trent.

Wanted, first-class botanical and anatomical slides, also diatom slides (selected), and good unmounted material of all kinds, in exchange for entomological preparations, mounted.—C. Collins, Bristol House, Harlesden, N.W.

Offered, *A. acicula*, *C. dubia*, *H. pisana*, *P. corneus*, *L. stagnalis*, var. *fragilis*, *H. rupestris*, *C. minimum*, and others, for *L. auricularia*, *L. glutinosa*, *Unio margaritifer*, *H. fusca*, and varieties of species.—Wm. Webster, Lofthouse, Wakefield,

Wanted, No. 242 of Science-Gossip.—R. C. Chaytor, Scrafton Lodge, Middleham, Yorkshire.

Goldsmith's "History of the Earth and Animated Nature," with notes from the works of the most distinguished British and foreign naturalists, illustrated by upwards of 2000 figures; Gosse on "Evenings at the Microscope;" and "One Thousand Objects for the Microscope by M. C. Cooke;" for exchange or otherwise, unbound vols. of Science-Gossip preferred.—R. C. Chaytor, Scrafton Lodge, Middleham, Yorkshire.

Wanted, Eocene fossils from Middlesex, Surrey, and Kent only, in exchange for others; must be named, localised, and perfect specimens. Also wanted, J. W. Lowry's "Chart of Characteristic British Tertiary Fossils;" state wants.—Geo. E. East, jun., 10 Basinghall Street, London, E.C.

Exotic butterflies.—Duplicates: *Orn. Priamus*, *Minos*, *Richmondii*; *Papilio Polymnestor*, *Hector*, *Diphilus*, *Philoxenus* (fine), *Paris*, *Polyctor*, *Zalmoxis*, *Hesperus*; *Urania Rhypheus*; *Leilus*; *Attacus Atlas*, etc. Wanted, other exotic Rhopalocera, particularly rare Papilios for figuring.—Hudson, Railway Terrace, Cross Lane, near Manchester.

Lepidoptera.—Duplicates: Io, Atalanta, Cardamines, Corydon, *S. populi*, *tiliæ*, *ligustri*, *tiliaria* (= *alniaria*), Defoliaria, Dilatata, Rhomboidaria, Pyraliata, Dubitata, Piniaria, Rubiginata, Æscularia (♀), Bucephala, Perla, Elymi, Lutosa, Suffusa, Megacephala, Lucifera, Ferruginea (fair), Oxyacantha, Lota, Spadicea, Rostralis, Hortuellia, Pratellus, Cerella. Desiderata: Pupæ of Carmelita, Chaonia, Dodonæa, or offers.—George Balding, Ruby Street, Wisbech.

Micro-slides: a few slides of cane-sugar for polariscope (very brilliant), also some selected diatoms and miscellaneous mounts; exchange for other good mounts; mutual approval.—Mathie, 42 McKinlay Street, Glasgow.

Well-mounted slides of Diatomaceæ in exchange for other well-mounted slides, Forams. and Polycystina preferred. Send list.—W. M. Ranson, The Cottage, Priory Road, Anfield, Liverpool.

Micro-slides.—Two beautiful objects for polariscope, viz., spicula of Synapta *in situ*, and leg of cockchafer, showing muscular structure; in exchange for two good insect mounts.—J. B. Bessell, Fremantle Square, Bristol.

Science-Gossip wanted, any No. from commencement to 34, also 51, 52, 55 to 59, 67, 68, 72, 76, 83, 84, "Entomologist" 187, 199, 202, 221, 243, 244, 248, 249, 250. Good exchange given for any of above.—W. T. Taylor, Seymour House, Keswick.

I wish to receive American plants in exchange for plants of Europe, and especially of France and Switzerland.—Mouillefarine, 46 Rue St. Anne, Paris.

Wanted, coins, medals, tokens, old china and bric-à-brac generally; in exchange can offer fossils, shells, minerals.—F. Stanley, 6 Clifton Gardens, Margate.

Wanted, Huxley's "Crayfish" or "Practical Biology:" will give the April, July, October, 1885, and January 1886 parts of "Journal of Microscopy and Natural Science."—H. Hiller, 82 Pinstone Street, Sheffield.

"Compendium of the English Flora," by Sir J. E. Smith, 1884, with a printed list of Yorkshire plants by Ibbotson; Bloomfield's "Poems," illustrated by Bewick, 1811; Inglis's "Channel Islands," 1834; Audubon's "Ornithological Biography," 1831, folio, one volume, no illustrations; Forrest's "Sculptured Rocks on Rombalds Moor," pamphlet, rare; MS. lists of Wakefield and Pontefract shells, for other natural history books or specimens.—Geo. Roberts, Lofthouse, Wakefield.

Swift's clinical and sea-side microscope with 1-in. objective, spot lens, and tripod foot, good condition. Also capital ½-in. objective by E. Swift (for binocular). What offers? Apparatus. Wanted a good compressorium, Ross model.—E. B. L. Brayley, 13 Burlington Road, Clifton, Bristol.

Wanted, a good second-hand slide cabinet to hold 500 or 750 slides, either oak or mahogany; state requirements.—W. Henshall, The Hollies, Bredbury, nr. Stockport.

Valuable collection of British land, freshwater and marine shells, and a few foreign; 360 species and vars.; nearly 2000 specimens, named and localised; offers requested.—Thos. H. Hedworth, Dunston-on-Tyne.

Wanted, parts 1 to 16 of the "Journal of Conchology," or any of them, also British land, freshwater and marine shells in exchange for others; lists on application.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

Science-Gossip in numbers for the years '80, '81, '82, '83, '84, '85, with 24 coloured plates; to exchange for coins or natural history books.—Jas. Windoes, Chipping Norton, Oxon.

L. C. 7th edition offered: 1142, 1646, 420*b*, 421, 463, 464, 464*c*, 468*e*, *i*, *g*, *w*, 452, 406. Many desiderata.—W. S. Harrison, 15 Park Place East, Sunderland.

A good exchange for any of the following: *Limnæa glabra*, *L. glutinosa*, *L. involuta*, *Acme*, *Vertigo alpestris*, *V. pusilla*, or *Geomalacus maculosus*.—S. C. Cockerell, 51 Woodstock Road, Bedford Park, Chiswick, W.

Science-Gossip, January '84 to May '85, 16 parts, excluding March '84. All clean and perfect, with plates. Wanted, well set specimens of Coleoptera, Lepidoptera or Hymenoptera; write first.—W., 22 Richmond Terrace, Clapham Road, London.

Wanted, *Thecla betulæ*, *T. Pruni*, *T. W. album*, *T. Quercus*, *T. Rubi*, *Leucophasia sinapis* and *Polyommatus Ægon*. Send list of requirements for a good series of any of the above.—F. A. A. Skuse, 36 Campbell Road, Bow, London, E.

Wanted, Ægeria, Davus, Sibilla, Argynnidæ and Lycœnidæ, in exchange for freshwater rotifers.—W. Hayles, 9a Union Road, Cambridge.

I will send one dozen micro-photographs of natural history objects, in exchange for an equal number of slides of insect preparations in balsam; Enock's, Topping's or Norman's preferred.—M. H. Robson, 18 Albion Place, Newcastle-upon-Tyne.

Wanted, museum specimens of an ethnological and anthropological character. A large selection of microscopic slides of marine life, etc.; North American and British shells; Crustacea, and other specimens offered in exchange.—Ed. Lovett, West Burton House, Outram Road, Croydon.

Wanted, foreign correspondents for the exchange of insects of all orders.—S. L. Mosley, Beaumont Park Museum, Huddersfield.

Wanted, Gottsche, Lindenberg and Nees' "Synopsis Hepaticarum," clean copy if possible. Exchange in books.—W. Smith, Ormiston Lodge, Arbroath.

Wanted, specimens of British Chrysididæ or Vespidæ in exchange for living chrysalides of *Megachile ligniseca* and *Crabro leucostoma*.—D. W. Collings, 22 Balfour Road, Highbury, N.

BOOKS, ETC., RECEIVED.

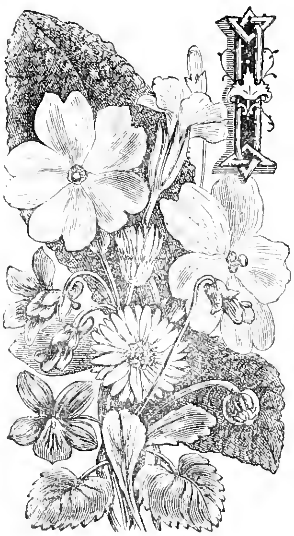
"The French Metrical System," by Christopher Giles, Adelaide (London: R. Banks & Son).—"The Definitions of Euclid," by R. Webb, M.A. (London: Geo. Bell & Sons).—"Modern Science: a Criticism," by Edward Carpenter (Manchester: John Heywood).—"British Cage Birds," parts 5 and 6; "Book of the Goat," part 5; and "Fancy Pigeons," part 5 (all published by L. Upcott Gill, London).—"British Petrography," part 1, by J. J. Harris Teall, F.G.S.—"Transactions of the Seismological Society of Japan."—"The Surrey Garner."—"The Scientific Enquirer."—"The Journal of Conchology."—"The Illustrated Science Monthly."—"The American Florist."—"The American Monthly Microscopical Journal."—"The Botanical Gazette."—"Cosmos."—"Science."—"The Amateur Photographer."—"Ben Brierley's Journal."—"The Rochdale Field Naturalists' Journal."—"Feuille des Jeunes Naturalistes."—"The Garner."—"The Naturalist."—"The Midland Naturalist."—"Journal of the Quekett Microscopical Club."—"The American Naturalist."—"British and Colonial Druggist." &c. &c. &c.

Communications received up to the 12th ult. from: L. J.—M. A. H.—S. C. C.—W. B. G.—J. L.—H. E. Q.—G. A. B.—W. F., jun.—A.—F. C. G.—I. M.—T. G.—P. T. D. T. W. M.—T. W.—W. B. G.—J. E. L.—R. W.—R. L. W.—E. H.—C. C.—B. P.—W. C. C.—E. G.—L. E. A.—F. G. L.—W. M.—J. E. T.—R. D.—S. A. M.—W. C. C.—J. B.—D. W. C.—L. E.—N. O. R.—A.—F. G. L.—C. P. C.—G. F.—T. E.—J. S. S.—L. W. W. P.—G. A.—R. T. J.—J. J. N.—W. M.—L. E. A.—P. Q. K.—A. S.—M. T.—H. E. T.—M. T.—T. E. E.—K. M. W. T.—T. M.—E. W.—G. H.—M. B.—J. M. F. W. W.—G. H. J.—W. S. B.—H. A.—Dr. A. M. M'A.—H. G. W.—B. H. W.—C. P. F.—L. B.—C. B. M.—W. H.—H. P. M.—B. H. W.—H. M.—F. B.—J. W. W.—W. D. C.—J. M.—W. J.—J. G.—F. H.—T. F.—J. W. C.—T. J. P.—W. H. H.—W.—F. S.—C. C.—M.—W. T. T.—J. C. P.—L. K. B.—J. B. B.—W. M. R.—B. T.—W. M.—S. M.—B. H. W.—G. B.—H.—W. E. C.—G. E. E.—A. D.—M. E. T.—R. C. C.—E. L.—A. P.—F. J. W.—W. W.—W. F., jun.—C. C.—Messrs. S. S. & Co.—S. C. C.—E. C. B.—W. S. H.—J. W.—Dr. M.—A. S.—J. R.—T. H. H.—M. D. H.—W. H.—E. B. L. B.—P. E. G.—J. W. H.—J. T. T. R.—G. R.—H. H.—W. G.—W. H.—J. C. T.—F. A. A. S.—W. R.—M. H. R.—&c. &c. &c.

ON ANIMAL BEAUTY.

By Dr. P. Q. KEEGAN.

[*Continued from p.* 64.]



IN the next place, the beauty of colour in animals claims our attention. The beauty of form is, as we have seen, referable to the internal skeleton, the muscular and fatty tissue; but it would appear that the blood, the skin, and the liver are principally concerned in the production of organic tint and hue. This species of beauty is in its effect more sensuous and less "intellectual," than the beauty of form. Nothing can exceed the loveliness, the gorgeous colouring of the humming-birds, the sun-birds, many fishes, the trogons, Buprestidæ, etc. Iridescence produced by the fibres, and the deposition from the blood of distinct pigments, are the two immediate sources of animal colours. The chemical constituents of the blood, its activity and richness, and above all the oxygen with which it is saturated, contribute to their production; and frequently the transparency of the tissues imparts thereto a fairy-like aspect which is inexpressibly charming. In discussing the subject of form we have observed how it is that to every animal configuration there is set, as it were, an ideal exemplar or model which it more or less embodies according as it exhibits more or less of beauty. In the species of beauty we are now reviewing, the necessity of such an ideal is not so patent, nor does there appear therein such an obvious development of force or such a thorough elaboration of structure. When we see a hideous or loathsome shape we recognise some defect of harmony or of congruity; when we see a pale or repulsive colour, we judge it to be deficient in itself and as of itself. Another feature worthy of notice is that, once an animal is made, its stamp of form and contour is generally preserved throughout its life; whereas its colouring is frequently subject to periodical change.

This periodical change of colour is observable especially amongst birds. It is known that a change takes place in the plumage of all birds at the beginning of the breeding season. The pigment cells of the feathers, etc., either increase in number, or, if already developed, become expanded. These lovely creatures are never more lovely than in the spring-time, when their apparel changes in a wonderful manner from the sombre shades of the winter to colours and tints the most gorgeous. And this is the very season when their life-energy is most potent and actively elevated; when, almost perpetually on the wing, they flit restlessly from branch to branch, or make the woodlands echo with their songs, or vigorously engage in the active duties of parentage. Fishes, too, at the breeding season assume lovely colours, and roam in shoals over the waters, or pertinaciously advance up rivers. In the case of insects it is seen that so long as they remain in the dull and lifeless larva and pupa states they are comparatively unattractive; but, once they assume the imago or perfect condition, they become active and beautiful. The beetle tribe, which haunts and moves slowly about the ground and rarely takes wing, is not very lovely; but the remarkably active and practically energetic bee, dragon-fly, and butterfly, etc., are among the most gorgeously apparelled of animals. All this periodical or seasonable change or modification of colour would seem to indicate that animal beauty in this particular arises not from any of the more solid and permanent constituents of the organism, but rather from some (such as the blood) which is subject to great variation in respect to its quantity or quality or to (the most efficient of all) what we may style its vitalising property. Animal pigment consists of granules usually enclosed in cells, and these cells

appear and fade, and in some cases (as in the cuttle-fish) seem to be influenced by the will or nerve-state of the animal.

There can be little doubt that the beauteous colouring of animals is occasioned primarily by the presence of a large amount of oxygen in the blood or in the tissues. No doubt can be entertained that this gas has the property not merely of supporting life, but also of vitalising, animating, and beautifying the living tissues and fluids. Dark and dun venous blood, when infused by oxygen, immediately becomes bright and beautifully scarlet. This red blood suffusing the eyes (as in the look of love) or the cheeks (as in blushing) imparts to the human face its supreme attractiveness in these its moments of most eminent loveliness. And if we consider for a moment the potent influences in this respect of oxygen among material bodies, then shall we have an earnest of its sway in the case of organic bodies. Most schoolboys are familiar with the experiment of burning a piece of sulphur or phosphorus or iron wire in the gas, and the brilliant and beautiful sight thereby witnessed. Some metals (such as strontium, barium, copper, etc.) have the property of imparting to their salts when ignited tints of red, green, blue, etc.; but pyrotechnists in their coloured fires, in addition to these, always use nitre or chlorate of potass, which are highly charged with oxygen; and thereby the beautiful effects of their "stars," etc., are much enhanced. The aspect of fire in itself when not overpowering is pleasurable. Now, what is fire or heat? It is simply an act of rapid chemical union between oxygen and certain bodies called inflammables. When an inorganic body is heated the atoms or primary elements which compose its mass are thrown into a state of active motion, and the presence of oxygen around the burning body serves to increase and intensify this internal agitation. A similar effect no doubt occurs in the case of living tissues or organic bodies. The presence of oxygen in the blood increases the motion of its particles, and beautifies their aspect. The presence of oxygen in the tissues, especially the skin or epidermis, vivifies and increases its activity, its decay and repair, the special organic vitality of its molecules, and so-wise heightens its beauty. As the action of this gas beautifies and increases the motion of the ultimate particles of material bodies, so we may presume it beautifies and perfects the primary vital motions of animal tissues. In the former case the oxygen, it would seem, must be generated, or be external to the bodies: in the latter case, the oxygen would appear to be stored in the organic substance itself. Oxygen (as aforesaid) becomes latent, and is stored up in every one of the animal tissues, in every living bit of protoplasm. In this manner we shall perhaps be able to account for the wondrous transformation which those lavish consumers of oxygen, viz. birds, undergo in the spring-time. It would seem that during the winter the oxygen is gradually accumulated in the feathers and skin, and on the approach of spring it bursts into activity, when new feathers are developed, and the exquisite embellishment incident to that season takes place. This magnificent development of animal decoration is connected also with, or at least runs parallel to, the sexual impulse. The vital energy, actuated by the stimulating influence of oxygen, operates among other regions of the body, and stirs other functions as well as those of the skin and its appendages. In most animals the male is more beauteously apparelled than the female, and the former is in the spring-time more sexually perturbed than the latter. So also if we consider instances of animals not so signally decorated as birds, we shall find their comparatively sombre colouring related in some way to their small share of vernal vital energy. Thus the mammalia exhibit grays, black, brown, drab, yellow, fawn colours, but no green, and scarcely any blue or brilliant scarlet; and their periodical vernal energy is, as exhibited by their sexual propensities, dull and languid as compared with that of birds or fish. A few birds and insects, such as the trogons and some ground-beetles, are dull and silent, yet are they splendidly coloured. In these exceptional cases, however, it may be found that the animal energy, although individually concentrated, is limited in amount, or is drained off by some channel to be utilised in some other department of the animal economy. The great Darwin, viewing, as was his wont, everything from a material or sensuous point of view, was of opinion that active or voluntary sexual selection is one of the chief causes, if not the chief cause, of all the variety and beauty of animal colour. This agency, however, although it may to some extent practically account for the actual beauty of certain individuals at present existing, cannot be considered the fundamental cause thereof. Sexual selection is at best a secondary and, as it were, visible or tangible agency that occasions the primary and recondite cause to operate.

(*To be continued.*)

NOTES ON NEW BOOKS.

Geology: Chemical, Physical, and Stratigraphical, by Joseph Prestwich, M.A., F.R.S., etc. In two volumes: vol. i. Chemical and Physical (Oxford, at the Clarendon Press).

The stony science cannot complain now of the want of advanced text-books. The real difficulty is which to select, for the best and most renowned teachers of modern geology have devoted themselves to writing manuals. No other science is now so well off in this respect. Jukes, Lyell (a new edition of which, by Duncan, we recently noticed), Phillips (edited by Etheridge and Seeley), the two Geikies

(Archibald and James), besides a host of minor, but important, writers; Clifton-Ward, Jukes-Brown, H. B. Woodward, W. J. Harrison, W. H. Penning, etc., every one of whom must be considered both a capable and authorised teacher.

And now we have another—two promised volumes, of which the present is a substantial proxy—by the veteran geologist, Professor Prestwich. Such a work ought to be, is sure to be, of the utmost importance. Those who personally know the man—his enormous and ripened knowledge of everything geological, literary as well as field-work—who are acquainted with the almost historical record of the innumerable papers he has contributed to various scientific societies, nearly all dealing with original observation and research—the gentleness, nay, modesty, of Prestwich (a rare attribute, of which, in these days, we may be reasonably proud as still existing among English scientists)—will expect that this new manual ought to fill, and will fill, a place none other can. No other science has developed, or accreted as well as exfoliated, so much as geology. And Professor Prestwich's active geological life extends to the days of Conybeare, Buckland, Mantell, Edward Forbes, Lyell, Salter, and others. What a treasure-house of rich geological recollections!

Moreover, Professor Prestwich was always distinguished for the lucidity of his style of writing. We are afraid the literary faculty is not always cultivated among scientists as it ought to be. It is surely of great importance, if we have anything to say, to be able to say it. Whatever Professor Prestwich says in the present volume is said well.

Professor Prestwich has remained consistently conservative amid all those radical changes which have succeeded each other so rapidly that they have eventually come round to the original point of departure. He has always held aloof from Lyell's charming theory of "Uniformitarianism"—of natural forces always acting as we see them now. Professor Prestwich's view has always been that "the phenomena of geology, so far from showing uniformity of action in all time, present an unceasing series of changes dependent upon the circumstances of the time; and that, while the laws of chemistry and physics are unchangeable and as permanent as the material universe itself, the exhibition of the consequences of those laws in their operation on the earth has been, as new conditions and new combinations successively arose in the course of its long geological history, one of constant variation in degree and intensity of action."

There are twenty-four chapters in this volume, none touching on fossils except chapter v., which deals with the "Order, Place, and Range of Past Life." Here Professor Prestwich is *too* conservative, notwithstanding his adherence to the evolutionistic cause; for he arranges the existing order of animals, invertebrate and vertebrate, in a classification which has been exploded for some time; and which we hope the author will correct in another and a speedily required edition of this valuable life-work.

Catalogue of the Palæozoic Plants in the Department of Geology and Palæontology, British Museum, by Robert Kidston, F.G.S. We are pleased to notice this work (first) because the trustees of the British Museum are the only Government authorities who behave towards the scientific press of this country after the generous manner of the United States Government, in sending out their publications for notice, and in thus letting the world know what they are doing; and (second) because no man has carried scientific common sense into the region of Palæo-botany more than Mr. Robert Kidston. An enormous amount of comparative work is here condensed into scientific order, and the result is of the utmost importance to geologists.

The Tourists' Guide to the Flora of the Alps (London: Swan Sonnenschein & Co.). This is the very sort of book we are frequently asked to recommend by botanical tourists. It was compiled by Prof. Dalla-Torre, and has been translated and edited by Mr. A. W. Bennett, so that it comes to us with high warranty of excellence. The original work was issued under the auspices of the German and Austrian Alpine Club in Vienna. The get-up of the work is artistic as well as utilitarian, for its red morocco cover wraps over like a pocket-book. The paper is thin, but strong; the type clear, and the book can easily be stowed away in the breast-pocket.

Lewis's Pocket Medical Vocabulary (London: H. K. Lewis, 136 Gower Street). A capital little dictionary of the vast specialistic terms in medical science which even the most distinguished of practitioners cannot be expected to carry in his head; and why should he, when this little book of 217 pages carries them much better in his waistcoat pocket?

Handbook of Mosses, by J. E. Bagnall, A.L.S. (London: Swan Sonnenschein & Co.). There was unquestionable room for a popular work of this kind, and we do not think any botanist in England could have been better selected to compile it than Mr. Bagnall. It deals with the appliances required for the study of mosses, their development, habitats, classification, geographical distribution, cultivation, uses, preparation for the herbarium, etc., and is profusely illustrated and published at one shilling.

We have also received—*Kaffir Folk-Lore*, by G. McCall Theal, second edition (London: Swan Sonnenschein & Co.), a selection from the traditional tales current among the people living on the eastern border of Cape Colony. The study of folk-lore is now very popular, and this work is therefore both useful and interesting. By-and-by we may expect some writer will have genius enough to establish a *comparative* system of folk-lore. Also, *History of the*

German Language (same publishers), by H. A. Strong, LL.D., and K. Meyer, Ph.D. Both the authors are connected with Liverpool University College. They have written the book to supply a want often felt by professional teachers, to whom it will come very handy. *Rudiments of Chemistry*, by Temple Orme (same publishers). Another addition to the increasing library of chemical works. It professes, however, to be only the merest elementary introduction, and it really explains the nature of chemical research rather than attempts to teach the science of chemistry. It is remarkable for the simplicity and lucidity of the style, and will be an excellent boy's first book in chemistry.

A Plea for the Rain-band, by J. R. Capon, F.R.A.S. (London: E. Stanford). This is a re-issue, in a more permanent and attractive form, of Mr. Capon's now celebrated pamphlet (which latter has been long out of print), with additions. *Modern Science: a Criticism*, by Edward Carpenter (John Heywood, Manchester), shows extensive reading, but poor logic, and contains pages of such assertions as that "Astronomy is the most perfect science *because we know least about it*"! Life is too short for books of this kind to stand a chance of success.

The Definitions of Euclid, by R. Webb (London: George Bell & Sons). Useful to teachers in supplying hints for explanations of difficulties felt by beginners. Euclid will no longer seem foolishness to a boy who has this book to help him.

A SYCAMORE FUNGUS.

In the account of a "Nettle Fungus" in the February number (p. 35) we were concerned with that group of the Sphæriaceæ in which the mouth is elongated transversely so as to form a kind of crest or ridge. The fungus with which we are now concerned belongs likewise to the Sphæriaceæ, but to that group in which the ostiolum is elongated vertically so as to form a beak or rostrum. In more familiar terms it may be compared to a chimney, seated usually on the summit of the perithecium, up which the sporidia have to climb before they can emerge into the light. This chimney, like a real one, generally terminates in a circular opening at the top, although in a few distantly allied species (Melanospora), the opening is surrounded by a fringe or tassel-like arrangement of threads—is in fact fimbriate.

The ordinary type of a Sphæria has a more or less globular perithecium, which in by far the majority of cases is crowned with a little prominence or papilla, terminating in a pore. This papilla is in other cases slightly elongated, and it is obvious that what is called a beak is only a more exaggerated form of the same organ, all the intermediate stages being observable in one species or another. The departure of the beaked Sphærias from the typical form is less striking than is that of the long-mouthed Lophiostomaceæ, though even in the latter case also the gradations of change are visible in some species.

This is probably the reason that induced Saccardo, in his "Sylloge Fungorum," to adopt a different procedure in the two cases. He separates the crested Sphærias entirely from the Sphæriaceæ, and constitutes them, as I have shown, into a distinct family. But the beaked Sphærias he distributes throughout

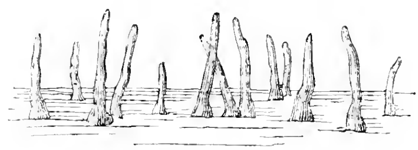


Fig. 48.—*Lentomita ampullasca* (*in situ*), showing the beaks emerging from the bark. × 50.

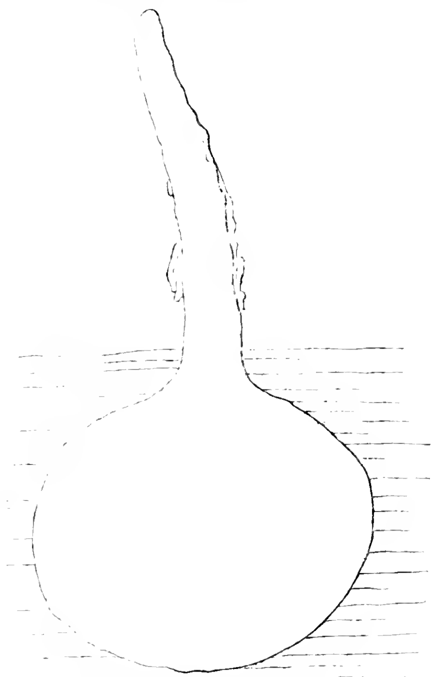


Fig. 49.—A Single Perithecium. × 100.

the Sphæriaceæ, according to the form and colour of their sporidia.

This is, I think, a mistake. The two groups stand on the same footing, and are entitled to similar rank; they should both be considered as sub-families of the Sphæriaceæ. In regard to the beaked Sphærias, in fact, this is what Saccardo himself would prefer. In a note on p. 227 of the second volume of the "Sylloge," which seems to have escaped the notice of his critics in this country, he recommends that all those genera which have a decided beak should be united by his successors in a sub-

family to be called Ceratostomeæ.* This is important, as showing that he is not wedded to his "carpological" arrangement, when it is convenient and just to depart from it.

It is frequently forgotten that, although the ultimate aim of systematic arrangements of plants is a genealogical one, yet, while our knowledge is as imperfect as it is in the case of the Fungi, we must be content with that approach to our ideal which is most convenient in practice. After all, one of the objects of classification is ease of reference, so that we may readily identify the species which we find. This was indeed the chief object of the "Sylloge," and how delightfully it fulfils that purpose is known to all who use it. Afterwards, with fuller knowledge, a more natural arrangement still may be evolved.

It was on the last day of the just departed year that I found, at Sutton Coldfield, a prostrate trunk of sycamore from which the bark had been partially removed. A perfect storehouse of fungi it turned out to be, and I may on a future occasion give an account of the other riches it produced. On the inner side of the hanging strips of bark, nestling among the fibres of the liber, were numerous black dots, conspicuous under a lens on account of the long projecting beaks that looked like a forest of smoky chimneys (Fig. 48).

The contents of the perithecia (Fig. 49), pressed out in water under the microscope, attracted attention at once on account of the very peculiar outline of the asci, which will be seen in Fig. 53.

This naturally reminded one of the figure given by Cooke, in the Handbook, of the asci of his *Sphæria ampullasca*,* p. 876. The perithecia also agreed in every respect, except that the beaks were scarcely as long as he describes; but the sporidia presented a decided difference. The sporidia of Cooke's specimens were "narrowly lanceolate" or rather oblong-fusiform, with a guttula at each extremity, and continuous, i.e. not septate. Mine, on the contrary, although closely alike in size and shape, were somewhat curved, and showed in the centre an undoubted though faint, transverse partition. A wider search, however, revealed many of the sporidia without this septum, and with the guttula at each extremity.

Others also were found, unseptate and furnished with a hyaline conical appendage at each end. These, however, could not but be less developed states of the other forms, inasmuch as I had placed only one perithecium under the microscope, and all the forms proceeded therefore from one individual. It may be remembered that the same deciduous appendages were found in the case of *Lophiotrema angustilabrum* (*supra*, p. 37).

Fig. 50.—Two adjacent Perithecia. × 50.

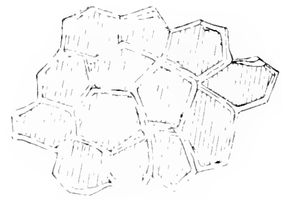


Fig. 51.—Hexagonal cells of Perithecium. × 1000.

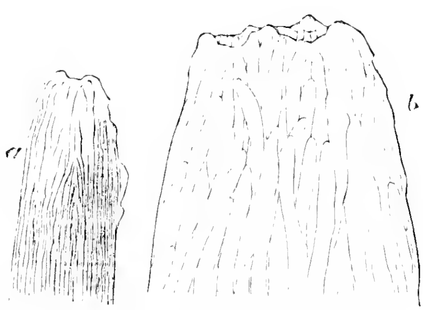


Fig. 52.—Apex of beak. *a*, × 300; *b*, × 1000, showing vermiform cells.

Fig. 53.—*a*, Ascus of *L. ampullasca*, × 500; *b*, more shortly stalked ascus, × 1000, showing the thickened bilobed membrane at the apex; 1–6, the sporidia (the numbers indicate the presumed stages of growth); at *x*, two injured sporidia.

* Horn- or beak-mouthed.

* Having asci shaped like an ancient jar or ampulla.

The septum was, as I have said, faint and delicate, and perceptible only under a magnifying power of 1000; but nevertheless no doubt could exist as to its reality, as will be seen from comparing Fig. 53 *x*. If a sporidium, when slightly crushed, separates into two parts as there represented, or if one part can be empty and dead while the other is still fresh and uninjured, it must be two-celled. Moreover, I afterwards met with more developed specimens in which the septum was a conspicuous feature.

Now the presence of this septum removes the species from the genus in which Saccardo has placed it. He knew it only from Cooke's description in the Handbook; so it appears in the "Sylloge" under No. 1549, as *Ceratostomella ampullasca*. But henceforth it must be placed in the genus Lentomita, which has two-celled sporidia. It is interesting to notice, as confirming the accuracy of this conclusion, that the other species of Lentomita are said to have the internal membrane of the asci thickened at the top. This I observed in my specimens, as will be seen in Fig. 53*b*, where the thickening is represented as crenately bilobed. Under a lower power this projection of the membrane appears as a bright circular spot (Fig. 53*a*), and forms perhaps that "globose body" which Messrs. Berkeley and Broome observed at the tip of the asci of *Sphæria pilosa*, "the nature of which" they "were unable to determine."

Another point worth notice in my specimens is that the black (really dark brown) colour of the perithecium becomes paler upwards, and at the tip of the beak almost disappears. Moreover the wall of the perithecium is submembranaceous: that is, the cells of which it is composed can be clearly seen. They are hexagonal in shape, 15 μ in diameter (Fig. 51), but they become elongated at the base of the rostrum, and at the apex they form a subpellucid prosenchymatous tissue, of vermiform cells 30 μ long and only $2\frac{1}{2}$ μ wide (Fig. 51).

It thus appears that Cooke's species, *Lentomita ampullasca*, occurs not only on oak, as he records it, but also on sycamore, *Acer pseudo-platanus*. But this is not all. The form which I have been describing occurred on the inner side of the liber layer of the bark; the perithecia were globose or ovate, immersed and scattered (Fig. 48), although here and there two or three could be found in close contact (Fig. 50). Occasionally, however, on the outer side of the same bark, were found clusters of perithecia which differed in two respects—the beaks were sometimes shorter; and, when the outer bark was removed, the nearly ovate perithecia were left seated just within the surface of the inner bark, i.e. nearly superficial. But the identity of the two forms could not be doubted.

Now in the Handbook, p. 877, immediately after the description of *Sphæria ampullasca* is found another of *Sphæria stylophora*, B. and Br., which is said to have the "perithecia at first covered, at length free, disposed in orbicular patches, ovate, attenuated upwards; ostiola longer than the perithecia; asci broadly clavate; sporidia fusiform, hyaline, uniseptate, appendiculate at either end." Moreover it occurred on *Acer platanoides*.

It is obvious that, so far as it goes, this description will apply very nearly to the second form of *L. ampullasca*, which I have mentioned. The size of the sporidia is not stated, but the figure given by the authors closely resembles some of those from my specimens, before the appendages have fallen off. The figure of the perithecia represents them with short beaks, but this is contradicted by the description.

Except by reference to the original specimens of Berkeley, it is of course impossible to establish the identity or non-identity of the two species beyond a doubt. I only suggest a possibility. But their resemblance is so close that it will be better to put Berkeley's species as a variety of Cooke's: say *Lentomita ampullasca*, var. *stylophora*. In some of my specimens the perithecia grew in dense oval patches, though in other respects remaining absolutely identical with the typical scattered form.

One word in conclusion. It will be seen that the position of a fungus in Saccardo's "Sylloge" is determined partly by the septation of its spores, and therefore changes if additional septa are discovered. This, if a fault, is one which the advance of knowledge will remove. There can be no doubt that many species are at present imperfectly known in this respect. If this occurs in the species described by authors of the pre-microscopic or early microscopic era, it can only be lamented; but if, as sometimes happens, perfunctory and imperfect descriptions are given by writers of the present day, it would be only just that those who come after them should altogether ignore their misleading attempts.

W. B. Grove, B.A.

Birmingham.

IN THE WOODS IN APRIL.

April 3rd, 1885.—A beautifully warm day, with the sun shining brightly—just one of those days on which out-door work can be pursued with pleasure and comfort, a condition not always granted at this time of the year.

At 9.30 A.M. we started for Burwell and Haugham Woods, which lie on the eastern foot of the Lincolnshire Wolds, at a distance of about five miles from Louth.

Before reaching the woods we had occasion to take out our pocket-book to note that frog-tadpoles had emerged from their ova. Many masses of ova also lay in the ponds as yet unhatched.

Having arrived at the woods, we made our way first of all to "the valley," the principal locality in the neighbourhood for the local marbled-white

(*Melanagria galathea*). It being between twelve and one o'clock, we sat down upon an old prostrate tree to partake of dinner, with a full view of this beautiful grassy opening and its steep wooded sides. Afterwards, while walking among the long grass at the bottom of the valley which in July and August is to bring forth in plenty *Melanagria galathea*, but which now lies in tangled masses upon the ground, we were delighted to see a hibernated specimen of the brimstone butterfly (*Gonepteryx rhamni*) come flying down the hollow. Not having a net with us, we gave chase to this angular-winged insect with our hat—the only entomological instrument at hand—but failed to capture. In many parts of England this is one of the commonest butterflies, therefore it is nothing unusual to see hibernated specimens in the spring; but in this neighbourhood it is not so, the brimstone being very scarce here. This was the first specimen I had seen for several years. The scarcity of this usually common butterfly may be accounted for, perhaps, by the fact, that the food-plant of its larvæ (buckthorn) is very rare, if not totally absent, here.

Leaving the "valley," we passed through the wood to another grassy opening, where the straight stiff stems of the ragwort (*Senecio Jacobæa*) will shortly rise. This spot is, we believe, the only locality in the district for the elegant black and crimson Cinnabar moth (*Euchelia Jacobæa*), the yellow and black larvæ of which will swarm on the ragwort in June, July, and August.

Plenty of primroses were in flower, and here and there a few wood anemones could be seen with expanded petals; in various places, too, the pretty but inconspicuous barren strawberry was in flower; but still it was evident that the woods would have yet to undergo great changes before they were ready for their welcome vernal guests, the pearl-bordered fritillaries.

During the day we saw four specimens of the small copper (*Lycæna phlæas*). As we had not heard of this butterfly hibernating, we concluded that these must be insects of the first brood. But still we think this (3rd of April) an early date. Entomological works differ as to the time of appearance, and even as to the number of broods of the insect. Stainton gives May as the month for the coming forth of the first brood. It is peculiar too that these insects were flying along at a considerable distance from the ground—out of reach—while those of the later broods are generally seen skipping over the short herbage of banks, roadsides, etc.

In these woods we noticed numerous platforms, i.e. rectangular sods supported near a tree-trunk by sticks, at about two or three feet from the ground. These the keeper informed us, are used to capture jays. On the top of the sod a trap is placed baited with birds' eggs, a few twigs being stuck into the sod to give the whole a natural appearance.

It does seem a pity that the jay, along with other birds, should be so ruthlessly destroyed. It is a revolting sight to all true lovers of the works of God to see beautifully plumed jays, innocent kestrels, together with sparrow-hawks, stoats, weasels, and other interesting denizens of the woods, hung mouldering upon the "keeper's trees." In the case of the jay very little harm can be done to the game, for, though it does occasionally take an egg or young nestling, the principal part of its food consists of acorns, seeds, fruit, insects, reptiles, mice, etc.; and, further, the cheerful presence of this bird in the woods ought to more than compensate the sportsman for the loss of a few eggs or young birds. Speaking of the jay, Jardine in the "Naturalists' Library" says, "Altogether he is an ornament and acceptable tenant of our woods." But gamekeepers cannot be made to believe this. On our putting the question, "Do jays do any harm?" to the keeper, he replied, "Yes, they suck eggs." The way in which he spoke showed that in his opinion no bird that "sucked eggs" had a right to live.

Leaving Burwell and Haugham Woods, we passed to the old chalk-pit in Burwell "pasture," familiar to us as another place frequented by *Melanagria galathea*.

Leaving this pit, we began to walk in a homeward direction, crossing through Maltby Wood on our way. At 5.30 we reached Louth again, after having spent a very pleasant eight hours.

H. WALLIS KEW.

Louth.

ON MARINE COLLECTING WITH THE SURFACE-NET.

[*Continued from page* 54.]

A VERY good way of making a live cell is as follows: The bottom is formed of a piece of "patent plate," and the sides by cutting an oblong 3×2 inches out of a piece of indiarubber three-quarters of an inch thick, and trimming it so as to leave the sidewalls about a third of an inch thick. The rubber is easily cut by means of a knife moistened with a strong solution of washing soda, and is cemented on to the glass bottom by means of marine glue. Such cells stand the knocking about, inseparable from sea life, better than those built up of glass, and are less trouble to repair when they get out of order.

The handiest form of simple microscope for this purpose is one in which the stage is composed of a piece of glass illuminated from below by a large rectangular plain mirror. The lens—one of about 1-inch focus is most generally useful—should be capable of being moved freely in a horizontal plane over the stage, as it will generally be found more convenient to move it than the cell; and, when capturing a specimen that has been recognised by its means, it is desirable to be able to turn it completely

out of the way. For picking specimens out of the cell there is nothing so handy as an ordinary section-lifter with a rather small blade. Searching in this way, the more peculiar specimens may be separated and set aside. Those that are intended for examination alive must be placed in a relatively large bulk of water, as they soon die if left for any length of time in a confined space.

While this preliminary examination is going on, the process of preserving the much larger portion not reserved for immediate examination may be proceeded with. For this all that is required is a glass funnel in which has been placed a piece of muslin, arranged like a filter-paper, and a couple of pickle-bottles, one of which contains a few ounces of rectified spirit.

As soon as a trayful has been looked over, its contents should be turned into this funnel, and the water allowed to drain off into the empty bottle. As soon as the whole has been collected in this way, a little fresh water is allowed to run through, to wash out the remaining salts, and, the bottle having been emptied, the spirit in the other is poured in and allowed to run through. The funnel is then shifted to the now empty bottle and the spirit poured through

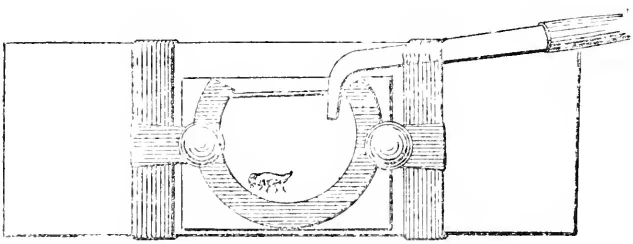


Fig. 54.—Aerating Apparatus applied to Live Cell.

again. By repeating this process two or three times the specimens are very rapidly and completely deprived of the greater part of their water.

The muslin is then gathered into a bag and suspended in a jar of ·580 s.g. spirit for twenty-four hours, after which the mass may be removed from the muslin and stocked in small, wide-mouthed bottles of spirit. If for this purpose absolute alcohol be employed, the specimens may be allowed to half-fill the bottle. With ordinary rectified spirit a more liberal proportion of spirit must be allowed. When engaged on daily work a considerable economy may be effected, by keeping the used spirit and employing it to extract the thick of the water from the next day's specimens. Prepared in this way, the specimens will keep for an indefinite time.

An alternative plan is to treat the mass in the muslin with glycerine in the same manner. This has the advantage of preserving the organisms in a beautifully clarified condition; but the treacly consistence of the medium does not lend itself so well to the subsequent process of sorting the specimens, and, moreover, the glycerine has a tendency to more or less dissolve and render brittle the delicate calcareous shells of Pteropods and other small mollusks. It may, however, be advantageously employed in cases where for any reason a liberal supply of alcohol may not be obtainable, as a much smaller bulk of glycerine will suffice for the purpose.

When a large catch has been made it is well to have two or three funnels at work, as it is very important to get the specimens spirited as soon as possible. To show the amount occasionally obtained, I may mention that on one occasion the mass taken in a single haul of the net, left out for the night, was sufficient to more than half-fill an ordinary pickle-jar.

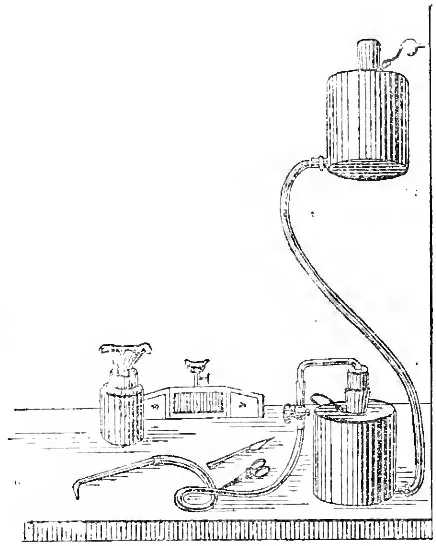


Fig. 55.—Aerating Apparatus.

A couple of hours is however quite long enough to leave the net, as a rule, as beyond that time the things first caught are apt to get damaged.

It is always worth while to examine some one species of each catch in the living state. For this purpose three or four, if obtainable, should be set aside in a good sized bell-glass of sea-water, as they die so rapidly in the contracted limits of a live cell that several subjects may be required for a complete examination. Apart from the wonderful view of their internal economy which their great transparency enables one to obtain, the movements of the animal allow of one's forming a much better idea of the relations and functions of its parts than can ever be got when dead, as then it is kept by gravitation obstinately in one position, in any other than which it will be found extremely difficult to retain it.

(*To be continued.*)

We regret to record the death of Mr. W. W. Leighton, who since the year 1867 has filled the office of Clerk of the Geological Society of London.

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

The Delights of Research.—The vulgar notion that scientific men are all "theorists" is best refuted by referring the subject of such delusion to a monograph by a specialist in any branch of natural history. This will show with what an immense amount of labour the details of science are obtained. A treatise recently published in Belgium on the anatomy of one species of nettle ("Recherches anatomiques sur les Organes végétatifs de l'*Urtica dioica*, L.," by A. Gravis, Brussels), which covers 250 pages, with twenty-three plates, and describes results obtained by means of 15,000 sections of this one plant, supplies a very good example. To an outsider, one of the self-styled "practical" people, who have never investigated anything thoroughly, such work appears miserably slow and wearisome. In jumping to this conclusion these people are very dreamy theorists indeed; for, as a matter of practical fact, no occupation is more exciting, more sensationally engrossing and enjoyable than a thoroughly penetrating research into the minute details of anything in Nature. The mere slayer of birds and quadrupeds, the man who strides on a horse and runs after a fox until some dogs kill it, and goes over the same routine of shooting and following again and again and again, is really a weary plodder, who leads a miserably slow life compared with that of the investigating naturalist. It is true that the brain must be trained to a very different condition from that of the sportsman before the greater excitement of the chase after truth can be enjoyed, just as the muscles of the thighs must be trained to enable the rider to grip his horse.

Crystallization and the Coagulation of Blood.—If water that has been well boiled to expel the air from it be placed in a smooth glass vessel, and cooled down without agitation, it may be brought many degrees below the freezing-point before any freezing commences; but if while in this condition a grain of sand, a minute bubble of air, or a particle of ice be dropped into it, crystals of ice suddenly start from the nucleus thus introduced, and the whole rises to freezing-point. Sulphate of soda (Glauber's salt) is very soluble in hot water—curiously so, as at 32° Fahrenheit water will only dissolve about ten per cent. of the crystals; at 91° they are soluble in the water they themselves contain; at higher temperatures their solubility decreases. If a saturated solution be made in boiling water, and the air be well boiled out, it may cool down nearly to the freezing-point without re-crystallizing, provided the bottle containing it is kept closed; but directly air is admitted, a sudden crystallization of the contents of the bottle takes place; they magically change from the liquid to a semi-solid condition. The experiment is very striking.

I am reminded of these experiments by some recent researches on the coagulation of the blood, which show that if it be poured when fresh into a smooth greased vessel it does not coagulate. It may stand thus for several days, provided no dust or other points are presented to it. It may be stirred with an oiled glass rod without coagulation, but if the rod be dry coagulation is started by it. Other experiments show curious analogies between coagulation of blood, i.e. the formation of fibrin, and crystallization. It must not however be inferred that coagulation is actual crystallization—that the fibrin threads are crystals, but that the act of solidification is in both cases subject to similar conditions.

Another Application of Photography.—It is well known to those interested that the issue of non-transferable season-tickets to exhibitions, railways, etc., is liable to be abused by unscrupulous holders. This is especially the case in exhibitions. At the recent Hungarian Exhibition of the resources of that country, a simple device for the prevention of transfer was adopted. The tickets were of leather; on one side was the name of the holder, and on the other his photograph, stamped by the exhibition authorities.

Minerals in Hungary.—I learn further from Mr. Bennett H. Brough's account of this exhibition, that, in spite of what we hear concerning the territorial power of the Magyar aristocracy of that country, all mineral deposits of technical value are the property of the crown, and that "royalties" there really are what their name and common sense and justice indicate. The minerals of Hungary thus belong to the Hungarian nation. I will say no more concerning what becomes of the vast amount of taxes we pay upon all our coal, our ironstone, and all other minerals in this country. I can name collieries where as much as 1s. 6d. per ton has been paid for the privilege of working the coal. If I say more my gossip will become political.

Arbor-Day.—The great prairies of Western America, in spite of the fertility of their soil, are barely habitable until planted with trees, on account of the meteorological violences of all kinds to which the vast seas of treeless, shoreless verdure are subject in their naked state. The early settlers protected themselves to some extent by planting little groves of cotton-wood and other quick-growing trees around their cabins, but still their cattle suffered severely from "blizzards," sirocco blasts, and other storms. Governor Morton, of Nebraska, struggled with the problem of widely extending such plantations, and finally hit upon a very successful expedient, viz. that of making the 1st of May a general holiday, on which all good citizens should make excursions and plant trees, with festal accompaniments, as cheerful as

dancing round a Maypole, and vastly more interesting and productive. This suggestion met with a ready response, and in the first year of its adoption more than two million trees were planted. The Arbor-Day festival soon spread far beyond the place of its origin. It is now formally adopted by seventeen of the United States. Even in the older northern and eastern states, originally over-wooded, some parts are now suffering from the ravages of axe and fire. School children, headed by their teachers, proceed in grand procession, with music and banners, and military battalions, to plant trees by hundreds of thousands in suitable spots, dedicating them in some instances, as in the Authors' Grove of Eden Park, to favourite authors and eminent statesmen. This development among the children appears to be a most promising feature of the movement.

Trees and Climate.—The effect of trees on climate has formed the subject of a recent article in Petermann's "Mittheilungen" by an able Russian observer, M. Wocikoff. He maintains that the diminution of evaporation effected by forests is not due to the lower temperature known to exist under their shadow, but that the most important factor is the resistance to the winds by the trees. This causes the air of the forest to be changed more slowly, and thus the saturated air is not so largely replaced by dry air, and the moisture is less rapidly carried away. The vicinity of a forest increases the summer rainfall considerably, but has less effect in winter. The storage of rainwater in the moss, fallen leaves and herbage of the woods, affords a supply to vegetation during dry seasons. A striking illustration of this is afforded by a forest on the western coast of the Caspian, where the vegetation is very luxuriant, although it never rains excepting in autumn and winter. M. Wocikoff has observed that forests lower the temperature of the country around them. In Bosnia the summer is five or six degrees cooler than in Herzegovina. This difference is attributed to the woods.

Properties of Pure Zinc.—All who have to do with voltaic batteries are acquainted with the troubles due to "local action," and the necessity for amalgamating the zinc plates to prevent it; and students of chemistry know that ordinary zinc decomposes water at its boiling heat. In a paper recently communicated to the French Academy of Science ("Comptes rendus," vol. 101, p. 1153), L. l'Hôte has described his experiments on pure zinc prepared by mixing artificial precipitated zinc oxide (instead of the natural ore) with calcined lamp-black, and distilling the metallic vapour downwards. He finds that the pure metal does not decompose water at boiling heat, nor is it attacked by dilute sulphuric acid. If however the pure zinc is melted and stirred with an iron rod, it takes up from 0·03 to 0·05 per cent. of iron, and the zinc, thus rendered impure with that very small quantity of iron, decomposes boiling water and dissolves in dilute sulphuric acid. Very small quantities of antimony or arsenic have the same effect.

These experiments confirm the old theory of local action, which attributes it to the presence of such impurities establishing local voltaic couples.

Poisonous Confectionery.—The results of the investigations of Messrs. P. Caseneuve and R. Lépine, described in their communication to the French Academy of Sciences ("Comptes rendus," vol. 101, p. 1167) should be widely known. They made experiments on the action of three coal-tar yellows which are used somewhat largely in colouring confectionery and beverages, viz. *Manchester* or *Martius yellow* (dinitronaphthol yellow); *N. S. yellow*, a sulphonic derivative of the Manchester yellow, and *solid yellow*, a sulphonic derivative of *amidoazo orthotoluene*. Manchester yellow, even in small doses, was found to have a strong poisonous action, producing vomiting, diarrhœa, panting respiration, and a high temperature, followed by death. N. S. yellow has no appreciable poisonous action, and solid yellow is similarly harmless.

Should this "meet the eye" of any manufacturer of yellow goodies or drinks, he will doubtless be guided accordingly in the selection of his colouring ingredient, as no such manufacturer would wilfully select a poisonous colour, though he may have done so without knowing its properties, as these are but recent investigations, and all confectioners do not read the weekly issue of the "Transactions of the French Academy."

Effects of Pressure on the Respiration of Plants.—Johannsen has recently made some interesting experiments on the effect of supplying plants with oxygen, first at ordinary atmospheric pressure, and then at pressures of two, four, and five atmospheres, the activity of vegetation being measured by the quantity of carbonic acid evolved. At first this increases as the pressure of the oxygen increases, but the increase is only temporary; the respiration gradually diminishes, more and more quickly as the pressure is greater, and the plants soon die. The most curious result is that which follows when the plant is subjected to the action of oxygen at a high pressure for short periods, and the excess of pressure then removed. The plant thus restored to the action of ordinary pressure shows a great increase of respiration, amounting to as much as 50 per cent. in the case of maize. The cause of this after-action is still a mystery.

Many of my readers have doubtless heard of the "Thomas-Gilchrist process." It consists in lining the Bessemer converter (the vessel in which the molten pig-iron is subjected to the blast of air), with

a basic material which combines with the phosphoric acid formed by the oxidation of the phosphorus contained in pig-iron made from the most abundant and cheapest iron ores. The phosphate thus obtained should be useful as a manure, and M. Fleischer has for some time past been working on the subject to determine whether such theoretical anticipation is verified in practice. The compound in question fuses readily, and, being lighter than the molten iron, floats on the top as a liquid cinder or slag. M. Fleischer, as a mean of several analyses, finds that it contains in 100 parts 17·5 of phosphoric acid; 48·29 to 49·6 of lime; 4·7 to 4·89 of magnesia, with small quantities of iron, alumina, manganese, free sulphur, sulphuric acid and silicic acid. Numerous experiments made at various experimental stations show very good results when this slag, ground to powder, was tried against other manures, and, although M. Fleischer thinks it premature to give a definite opinion, he believes that there is a good future for this material. Deep cultivation and mixture with the soil for tillage, and early top-dressing in meadow land, is recommended.

The subject is of considerable practical importance, as the quantities obtained are very great: many tons per day from every pair of converters in full work.

A GROUP OF ROTIFERS.

Notes on the Genus Euchlanis.

PERHAPS no class of animals have been greater favourites with microscopists than the Rotifera; their minuteness, the beauty and variety of their form, their liveliness, the remarkable transparency of their integument, their ubiquity, and the many unsolved problems in regard to their organization and life-history, have always exercised a charm equalled perhaps by no other class in the animal kingdom. Every possessor of a microscope has been more or less of an enthusiast, and has never tired of showing the wonderful "wheel-animalcules" to a circle of his admiring friends. This being the case, it is somewhat disappointing that so little is done towards elucidating the organization, or recording the habits and peculiarities of these remarkable animals. Our magazines, whether devoted to general natural history, or specially to microscopical subjects, rarely contain any articles or notes, either on this class or the more humble Infusoria. This has often been a matter of considerable surprise to me, especially when one calls to mind their wide distribution, so that no one is so unfavourably situated as not to be able, by carefully working his district, to procure, I believe, at least 50 per cent. of the species known to science. Considering the amount of activity being displayed in other branches of microscopical knowledge, and the further fact, that numerous natural history societies have been formed in various parts of the country, that surprise is certainly not lessened, but intensified. It is to be feared that too many of the possessors of microscopes apply them, in the words of the late lamented Dr. Carpenter, "in such desultory observations as are of no service whatever to science, and very little to the mind of the observer." It is a fact that all the advance that has been made in our knowledge of these animals in recent years has been due to a very limited number of earnest workers—a number which probably might be counted on the fingers of one hand. We may not all, by philosophic induction, comprehensive research, and enlarged generalisation, be able to discover "the grand and harmonious plan upon which all organic creation is believed to have been formed;" we may not either by nature or education be competent to discuss the zoological position of the Rotifera—whether they have most affinity with the worms, the crabs, or the insects; but the most humbly endowed amongst us, if not an absolute idiot, can become a careful observer of facts, and it is upon these only that a correct classification can be based. Holding these opinions, and thinking I might interest and possibly assist some of your readers, I have ventured to send these notes on the genus Euchlanis, family Euchlanidota. This family is one of the largest, containing, according to our present method of classification, eleven genera, and is second only to the family Hydatinæa. It is, however, more than probable that this number will be reduced, or at least that there will be a rearrangement; for instance, the three genera Metopidia, Lepadella, and Squamella, separated by Ehrenberg on account of supposed differences in the number of their eye-specks, were pointed out years ago by Dujardin as forming a very natural single genus. While not prepared to go so far, I may say that I have never come across any Rotifer with more than two eyes. My friend Mr. F. Sutcliffe, of Bacup, an experienced microscopist and careful observer, with whom I frequently work, confirms me in this, and further informs me that he has frequently found in the same gathering specimens otherwise indistinguishable with two well-developed eye-specks, and others in which these were quite invisible—an experience which is in keeping with my own. Dujardin also does not admit the genus Monostyla, but places the four species comprising it in the genus Euchlanis. The only species of this genus I have been fortunate enough to see is one which, from my description and drawings in the "Microscopical News" of June, 1884, Mr. Gosse identified as his *Monostyla bulla*; and it is confirmatory of Dujardin's opinion, that I had myself noticed its many points of agreement with other Rotifers I figured in the same number, not then identified, but since clearly proved to be a species of Euchlanis. On the other hand, the mastax of all my Euchlanes are of the brachionæan type, and vary very little indeed, except in size, while that of *M.*

bulla differs considerably both in the mallei and incus. The most serious objection however to incorporating Monostyla with Euchlanis is that in that genus the foot is said to be "simple, styliform." On this point Pritchard says, "Owing to the almost constant vibration of the foot-like tail, it is difficult to observe the true form of its termination, the motion producing an optical illusion; hence it appears double, though in reality single." In spite of this warning, I believe that the tail-foot of my *M. bulla* was a furcate one, although I may be mistaken. Further information on this point is much to be desired, and microscopists having the opportunity would do good service by working out this problem. In the genus Euchlanis the lorica is more or less depressed, and in some species is very diaphanous. Ehrenberg described it as being "slit inferiorly," and Pritchard figures *E. dilatata* as being quite open on the ventral surface. Cohn was the first to point out that the Danish naturalist was mistaken in this, and my own experience have not been able clearly to distinguish the margins of the two plates, owing to their thinness and transparency; indeed, this is often only made out by the careful and prolonged observation of numerous individuals. From a drawing and description I sent to Dr. Hudson, he was inclined to consider it as probably *Monostyla cornuta;* but that its tail-foot is a furcate one I have not the slightest doubt. This fact, and the further one of its dorsal and ventral plates being separated, place it in the genus Euchlanis; possibly it may be *E. Hornemanni*, though the description of that species in "Pritchard" is too meagre for me to feel very certain. Fig. 57 *a:* animal retracted, and showing its projection beyond the margin of dorsal and ventral plates; Fig. 57 *b:* animal exserted, and showing trochal wreath and longitudinal muscles.

Another Rotifer, slightly larger than the last, and evidently belonging to the same genus, is shown in Fig. 58, *a* and *b*. In this the lorica is somewhat broader than in the last species, and is truncated anteriorly.

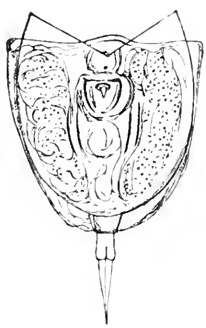


Fig. 57*a*.—Animal retracted.


Fig. 57*b*.—Animal exserted.


Fig. 58*a*.—Dorsal view. Animal retracted.

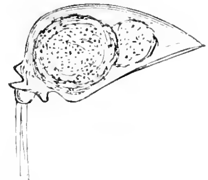


Fig. 58*b*.—Side view. Animal retracted.

confirms his. In a letter to me Dr. Hudson says: "No Euchlanis I have ever seen has a cleft-ventral surface to its lorica; in all cases the lorica consists, as you state, of an upper and lower plate, with a furrow between them, this apparently open groove being closed by a flexible membrane." The dorsal plate, in nearly all the species I have come across, is larger than the ventral, and is generally much more convex. It will be unnecessary for me to describe the two large handsome species, *E. triquetra* and *E. dilatata*, as they are fully described and figured in most works devoted to this subject. I have however come across four forms, which will not be so familiar to microscopists, and of which they may be glad to have figures and description. Fig. 57, *a* and *b*: this is a small Rotifer I have frequently been able to procure from a shady well in our neighbourhood. The lorica is ovate and excised in an angular manner in front, and there are four, either ridges or slits, on the back. Of the two plates, the dorsal one is the largest, and it is arched, while the ventral one is almost flat. I

Its foot is very short, so as not to project beyond the lorica, but the toes are long. Fig. 58 *a*, dorsal view, animal retracted; Fig. 58 *b*, side-view, animal retracted, showing the large arched dorsal plate covering the sides, and the small ventral one. In Fig. 59, *a* and *b*, is shown a Rotifer with many points of resemblance to the last. Like that species, it has a depressed lorica, broadly ovate, truncated anteriorly; but differing from it in having two anterior spines, and in the toes being somewhat shorter. It frequently remains retracted for considerable periods, but when it does extend itself it shows remarkable activity. It is not very transparent, being generally, but not invariably, of a brown colour. Fig. 59 *a*, dorsal view, animal retracted; Fig. 59 *b*, side view, animal exserted, and showing the considerable interval separating the two plates. It may possibly be Pritchard's *E. hipposideros*, but in my specimens the foot was not "armed with one pair of bristles," neither was the space between the plates exactly of the character indicated by its specific name. In all the above rotifers there

is the single eye, the depressed lorica, composed of two separate plates, characteristic of the genus Euchlanis, and in addition the jaws of all three are identical in all their parts, varying only in size. This latter character I consider as of the greatest value; and if we only knew accurately the structure of this important organ in the various species, it would considerably improve the chances of a correct classification of the Rotifera. On the other hand, the trochal wreath is not very obviously made up of rounded lobes in the above species, and this fact may induce our authorities to create a new genus, for these and others of a similar character.

The next Rotifer, Fig. 60, is an extremely interesting one, and is more like a typical Euchlanis, as it bears a strong superficial resemblance to the well-known

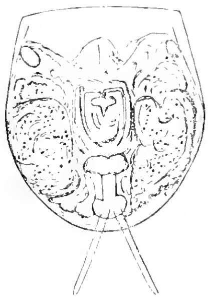


Fig. 59*a*.—Dorsal view. Animal retracted.

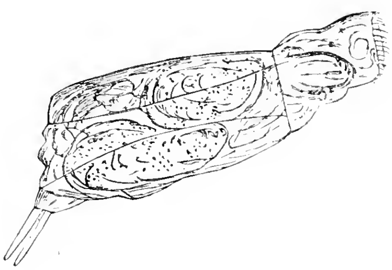


Fig. 59*b*.—Side view. Animal exserted.

E. dilatata. It differs from it, however, in being a smaller and altogether more delicate Rotifer, and in the character of its toes and mastax, the rami of my specimens being slighter than in that species, and they are turned downwards laterally in a beautiful curve. I take the following description from my note-book: "Lorica hyaline, depressed, oval, excised in front, rounded posteriorly; foot long, cylindrical, jointed; toes as long as foot, not knife-like, but round, and only slightly tapering; eyes, in adult, none visible; two eyes when young; jaws, large, brachionæan; rotatory organ consisting of rounded lobes; water-vascular canals, but no vibratile tags; eggs large, attached to conferva by a brownish protecting cover (not bands), probably chitinous." Then follows an account of the hatching-out of a young specimen, which I need not here transcribe. In reference to its having two eye-specks when young, I may say that I put this down on the strength of there being two coloured specks clearly visible in the egg; it does not necessarily follow that they were eyes, and, if they were, it is remarkable that not the slightest trace of them was visible in the adult Rotifer. It is unfortunate that I have hitherto been unable to clear up this point; however, some authorities consider that the eye-speck possesses less value as a basis of classification than Ehrenberg supposed. On the other hand, it is possible that it might have an eye, which, from absence of colour, or from being deep-seated, I failed to detect. Of this Rotifer Dr. Hudson says, "I have little doubt it is an Euchlanis." Subsequently, however, he expressed some little

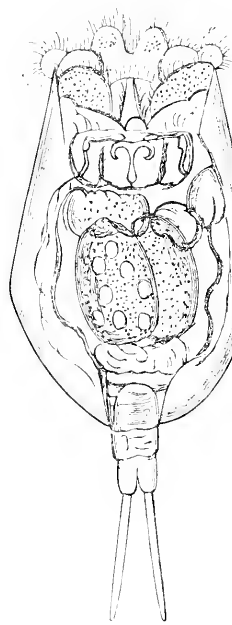


Fig. 60.—Euchlanis (?).

doubt, probably on account of my not detecting the eye, saying, "I know of nothing like it, and hope you may find it again, so as to complete the description." For myself I have now little doubt about it; the lorica, the trochal wreath, the mastax, the two stomach glands, and coiled water-vessels, all point to the genus Euchlanis, and it more resembles *E. macrura* than any other species whose description I have seen. It is all but useless, however, trying to identify many of the free-swimming forms of the Rotifera, as it is impossible in some cases to make them agree in all points with any species described in our text-book. In reference to this genus Dr. Hudson, in one of his letters to me, very truly observes: "The species of this genus are in wild confusion, and have, I believe, been described under various names." It is well

known that this authority, in conjunction with Mr. Gosse, has been working at this class for some years, and microscopists all over the world are anxiously waiting the completion of this forthcoming work. Is it too much to ask of those who have been collecting notes, and who are in a position to throw any light upon the subject, that they at once place their knowledge at the service of brother microscopists? If this is done, and if others who have microscopes, and have learned how to use them, will make good use of their opportunities, the forthcoming "monograph," or at least subsequent editions of it, will be made more complete, and really indicative of the state of our knowledge of this remarkable class of animals.

J. E. LORD.

Rawtenstall.

P.S. The second Part of Dr. Hudson's Monograph is now in the hands of subscribers, and is really a magnificent work. See page 90.

LEPIDOPTERISTS' WORK FOR APRIL.

WITH this month the real hard work of the lepidopterist begins, therefore a few remarks on the work to be done during the month may not be out of place. Especially will they be acceptable to the large and increasing number of our readers who are tyro-lepidopterists; though to the "old hands" there may be something new. In almost every writer's experiences we find something that we did not know before; and it may be of value to us to know it and bear it in mind, and at any rate it will do us no harm to read it again if we already know it.

We may fairly turn our backs on the winter now, and turn with pleasure to the work which the spring has brought us. Not that we have been idle during the winter months—surely not. I hope that our boxes and cages are pretty full of pupæ, from which imagos should now be emerging. Those of my readers who have not yet got their entomological apparatus in trim for the ensuing season should lose no time in doing so, for there will be no time for mending or making or cleaning up after now. All our time and attention will be taken up with the collecting of specimens, preparing them for the store-box or cabinet, and lastly, though most important, with the study of our captures.

During this month many ova are to be found. Many hibernating species deposit their ova about now, as well as several which are freshly emerged. Lose no time in this matter; search constantly for eggs, as they will not be so readily found when the trees are fully in leaf. There is nothing more delightful or more instructive in our most interesting study than the rearing of our specimens from the egg. Moreover, there is always something to be found out, always something new to be noticed, and all observations of such should be duly noted down. Females of hibernated butterflies and moths should be captured and kept alive, supplying them with sprigs of the larvæ food-plant if possible, in the hope of their depositing eggs thereon. Twigs of shrubs and trees, leaves and grasses, should be minutely examined for ova.

Of larvæ we shall find abundance, especially towards the latter end of the month. The hibernating species now begin to put in an appearance, and a thorough search for them will well repay the collector; for, as they are in most cases nearly full-fed, little trouble is given by them, and the imagos soon put in an appearance. Of the common species, *O. potatoria* may be found feeding on coarse grasses in hedgerows, *A. caja* and *A. villica* on low-growing plants, *B. quercus* on hawthorn, *L. rubi* amongst clover, &c., *D. cæruleocephala* will be found in plenty on hawthorn. I mention these because they are good subjects to try "preserving" on, and look well when done. Full instructions were given by me for preserving larvæ in SCIENCE-GOSSIP, vol. xix. p. 35. They add greatly to the value and beauty of a collection when placed in the cabinet with the imagos. *E. lichenea* will be found in its old haunts on the coasts, full-fed and about to pupate from now to July.

The lantern must now be used to search for larvæ by night; by this means the collector should reap a good harvest. Birch and sallow bushes should receive due attention, and undergo a close inspection; in the catkins of both larvæ of several species may be found. This should be thought of when visiting the catkins for moths; *Fimbria*, *Tincta*, and perhaps *Ditrapezium*, may thus be found. Sloe-bushes will repay a search—indeed, no bush or shrub should be passed by without a search for larvæ. Dead leaves should come in for a share of the searching. Many larvæ will be found in them, and pupæ too, especially in birch and sallow leaves.

The sweep-net must be plied unceasingly this month in all low herbage; valuable captures are often the result. Grasses and rushes are now productive of several Elachistidæ and Coleophoræ, and several larger tribes. Sheltered spots in woods are the best places, and for the larger species wet evenings the best time. Hawthorn trees nourish hordes of common larvæ.

Not much in the way of pupa-digging will be done this month, but the pupæ from hibernated larvæ just changed should be looked for, as also the chrysalids of some of the early summer butterflies, which, taken in this way, insure to the collector beautiful and perfect imagos. If dead leaves are observed still adhering to the trees, they should be brought down if possible, and examined; heaps of the same will often prove a prize. The hard brown cocoon of *D. vinula* should be looked for on the trunks of willows.

As the days lengthen and the sunshine gets warmer, the number of insects on the wing steadily increases, and amongst those due this month there are several rare species. Sallows are a great attraction, and should be well worked on warm evenings. Fences, tree-trunks, and heaps of stones should be carefully examined. Hibernating species may now be met with, both butterflies and moths; and though most of them will be "raggy," some few good specimens may be obtained. Beating thatch is a method often resorted to, and at this season many moths may be beaten out, particularly hibernating Geometræ. A little later on, numbers of Tineæ may be thus captured. Depressariæ and some other species are commoner now than before hibernation.

The treacling-pot will come into requisition, and light will prove a good attraction. The lamps should therefore be scanned. In districts where it has been previously taken, my readers should look out for *V. antiopa*, and I am sure we shall be pleased to hear of such captures.

One great prize to be looked for is *Endromis versicolora*, which flies briskly in woods near heaths by day. If any of our readers are lucky enough to secure a freshly-emerged female, they may try "sembling," and, if there are any more of the species about, they may be sure of a good harvest of males.

Towards the end of the month *Lobophora Polycommata* may be met with, and should be looked for at night on trunks of trees, with the aid of the lantern.

WILLIAM FINCH, JUN.

Nottingham.

ASTRONOMY AND METEOROLOGY.

By JOHN BROWNING, F.R.A.S.

IN the February number of SCIENCE-GOSSIP I referred to the discovery by MM. Paul and Prosper Henry, at Paris, of a new nebula by photography, which they had previously been unable to perceive by direct telescopic observation.

Professor Pickering states, in the "Astronomische Nachrichten," that certain irregularities had been noticed in a photograph of the Pleiades taken at Harvard College Observatory so long ago as the 3rd of November, 1885.

"They were supposed to be due merely to defects in the photographic process; but upon re-examination it appears that one of them corresponds so closely to what is described by MM. Paul and Prosper Henry, that there can be no doubt with regard to its origin. It must represent light photographically perceptible in the vicinity of the star Maia, as stated by its discoverers, who are undoubtedly entitled to the credit belonging to the perception and proof of this interesting phenomenon, although the Cambridge photograph seems to be the first upon which it is exhibited."

The Harvard photograph was exhibited at the Albany meeting of the National Academy of Sciences, on the 10th of November, and the irregularities then received some attention. Professor Pickering adds, that the explanation thus afforded of one of the markings on the photograph in question renders the others of more interest than at first sight appeared to belong to them. There are indications of nebulous light about Merope, and a faint narrow streak of light projecting from one side of Electra; but no such light would be seen about Alcyone, Atlas, Pleione, or Taygeta.

Mercury is an evening star at the beginning of the month, and a morning star at the end, setting on the 2nd at 7 hr. 44 min. P.M., on the 9th at 6 hr. 47 min. P.M., on the 16th at 5 hr. 47 min. P.M., on the 23rd at 5 hr. 6 min. P.M., and on the 30th at 4 hr. 48 min. P.M.

Venus will be a morning star throughout the month.

Mars will south on the second at 9 hr. 56 min. P.M., on the 9th at 9 hr. 24 min., on the 16th at 8 hr. 55 min. P.M., on the 23rd at 8 hr. 28 min. P.M., and on the 30th at 8 hr. 3 min. P.M.

Jupiter souths on the 2nd, at 11 hr. 16 min. P.M., on the 9th at 10 hr. 45 min. P.M., on the 16th at 10 hr. 15 min. P.M., on the 23rd at 9 hr. 45 min. P.M., and on the 30th at 9 hr. 16 min. P.M.

Saturn sets on the 2nd at 1 hr. 43 min. A.M., on the 9th at 1 hr. 17 min. A.M., on the 16th at 0 hr. 52 min. A.M., on the 23rd 0 hr. 26 min A.M., and on the 30th at 0 hr. 2 min. A.M.

There will be an occultation of Aldeburun, a first magnitude star, on April the 8th. The disappearance will take place at 5 hr. 8 min. P.M., and the reappearance at 9 hr. 55 min. P.M. On the 16th there will be an occultation of Manus. The disappearance takes place 9 hr. 5 min. P.M., and the reappearance at 9 hr. 48 min. P.M.

Meteorology.—The mean temperature of the week ending February 6th was 4° below the average, i.e. 4° in the corresponding week of the twenty years ending 1868; in the week ending February 13th it was 6·7° below the average; in the week ending February 20th it was nearly 4° below the average, and in the week ending February 27th it was 7·6° below the average. This is an almost unprecedented February for cold; the temperature was within a fraction of 6° below the average, for the whole month and the thermometer never once reached 50°. It only exceeded 40° on eight days in February. More exceptional still is the fact, that from February 16th to March 2nd the thermometer never touched 40° in London. There has certainly been no such February for thirty years.

The mean temperature of the week ending March 6th was 7·7° below the average, and for the week ending the 13th of March was 8·9° below the average; thus exceptional, as was February, it is

probable that March will be for cold still more so. Even in the Tropics the weather has been wintry. In the West Indies it has been cold, and in Calcutta a thermometer in an exposed position registered 36°, which is the lowest temperature ever known in or near Calcutta during any cold season.

Rain or snow fell on ten days in February to the aggregate amount of 0·73 in., that is nearly three-quarters of an inch. This amount, though very small, and much less than half the average, is equivalent to upwards of 82 tons to the acre. That the rainfall has been so low has been advantageous, the effect of moisture being on the whole to lower the temperature. Mr. Chadwick says that in one instance which came under his notice, an elevation of six degrees of temperature had been effected by the drainage of a thousand acres of land.

The average mean temperature of London in April is nearly 49° Fahr. The average rainfall of London is between one and two inches, while along the coast to the south and south-east it is full two inches, and on the south-west coast, west of Plymouth, it is three inches.

A NEW STAR GUIDE.

By John Browning, F.R.A.S.

A NEW Star Guide has just been published, which has been compiled by Messrs Latimer Clark and Herbert Sadler, who are both Fellows of the Royal Astronomical Society. This guide is intended specially for owners of small astronomical telescopes, from two to four inches aperture.

The authors justly remark, that many possessors of such small instruments strain their eyes and waste their time in the fruitless endeavour to catch faint nebulæ and separate difficult double-stars which are beyond the power of their telescopes. This Star Guide contains a carefully selected list of objects which may be well seen with telescopes of from two to three inches aperture, and in all it includes about six hundred of the most beautiful and interesting objects visible in the northern heavens with instruments of this description. The positions and times of transit are given for each tenth day in the year.

With very few exceptions no double-star has been inserted in the list the brighter component of which falls below the seventh magnitude—the magnitude of the smallest of the satellites of Jupiter—or the fainter of which is not brighter than a tenth magnitude star, or any forms which are too close to be conveniently seen in a telescope of small size. No red star has been included the colour of which cannot be seen, or any nebulæ or cluster which cannot be conveniently observed with such an instrument.

The distances of the double-stars are given in seconds and tenths, and the angle of position, and the magnitudes of the stars on W. Struve's scale.

Though popular, this work is scientifically accurate; its possession will double the value of any small telescope, and all owners of such instruments who avail themselves of it will feel under a debt of gratitude to the painstaking authors.

OUR SCIENTIFIC DIRECTORY.

[It is our desire to bring out a Scientific Directory in the monthly pages of Science-Gossip, feeling certain that it would be very useful for our readers to know what scientific societies had been formed in their own neighbourhoods. We shall therefore feel very much obliged if Secretaries of any kind of Scientific Society, in any town or part of the country, will send us the full name and title of each Society, together with the names of the President and Hon. Secretary.]

Bedfordshire Natural History Society and Field Club. Hon. Secretary, Mr. Thomas Gwyn Elger, F.R.A.S., Kempston, Bedfordshire; Hon. Treasurer, Mr. J. Ekins; Hon. Secretary of the Botanical Section, Mr. J. Hamson. Meets at the Assembly Rooms, Bedford.

Bolton Microscopical Society (affiliated to the Royal Microscopical Society). President, C. L. Jackson, F.R.M.S., F.L.S., F.Z.S.; Hill Fold House, Sharples, Bolton; Hon. Secretary, W. Ridecout, F.R.M.S., Seymour Road, Astley Bridge, Bolton.

Dover Field Club and Natural History Society (Wellesley Hall, 5 Townwall Street). President, S. Webb, Esq., Maidstone House; Hon. Secretary, Rev. T. Robinson, 9 Effingham Crescent.

Hemel Hempsted Natural History Society. President, J. Marnham, Esq., J.P.; Hon. Secretaries, B. Piffard, Hill House; J. H. Harley, Herbert Street.

Leeds Geological Association. President, Mr. T. W. Bell; Hon. Secretary, Samuel A. Adamson, F.G.S., 52 Wellclose Terrace, Leeds.

Liverpool Science Students' Association. Secretaries, W. H. Read, 24 Fern Grove, Liverpool; Miss H. Fryer, 11 Tancred Road, Anfield, Liverpool.

Nottingham Naturalists' Society (established 1852). President, H. Handford, M.D.; Hon. Secretary, W. Handley Kay, Gresham Chambers, Nottingham.

Portsmouth and Gosport Natural Science Society (Protestant Institute, Portsmouth). President, Gen. A. W. Drayson, F.R.A.S.; Hon. Secretary, T. H. Larcom, 54 Shaftesbury Terrace, Gosport.

Stroud Natural Science Society. President, Thomas Partridge, Esq., M.K.Q.C.P.; Hon. Secretary, D. Burford.

Sydenham and Forest Hill Microscopical and Natural History Club. President, Mr. E. L. C. P. Hardy; Vice-Presidents, Mr. E. F. Jones, Mr. F. Horniman; Secretary, Mr. A. C. Perrins, 12 Sunderland Villas, Forest Hill.

Warrington Field Club (the Museum, Bold Street). Secretary, W. H. Woodcock.

Wiltshire Archæological and Natural History Society. President, Nevil Story Maskelyne, Esq., M.P.; Hon. Secretaries, Rev. Alfred Charles Smith, Yatesbury Rectory, Calne; H. E. Medlicott, Esq., Sandfield, Potterne, Devizes.

SCIENCE-GOSSIP.

AT a recent sitting of the Paris Academy, Professor Pasteur stated that out of 325 cases of inoculation for hydrophobia, only one has failed, namely, that of the youth Pelletier, who came too long after being bitten, and under very unfavourable conditions. M. Pasteur advocated the establishment of an international hospital, to which patients would come from all parts of the world. At the close of the meeting, Professor Pasteur announced that he should next investigate whether diphtheria could not be treated by a similar process to that which he had found so successful against hydrophobia.

MR. G. R. VINE has been contributing an excellent series of papers to "The Naturalist," entitled "Micro-Palæontology of the Northern Carboniferous Shales."

AT the Society of Amateur Geologists, Mr. Henry Fleck recently read a paper on the "Crag Deposits of East Anglia." Professor Rudler has been kind enough to give the members a "demonstration" at the Jermyn Street Museum on "Common Rock-forming Minerals."

AT a meeting of the Entomological Society, Mr. H. Goss read an analysis of M. Brongniart's recent work on "Les Insectes Fossiles des Terrains Primaires" (Rouen, 1885), and expounded that author's views on the classification of insects from geological data.

THE Society for Promoting Christian Knowledge are bringing out an excellent series of photo-relief maps. We have received the map of Scotland. The aim of this series is to present the various divisions of the globe as if in actual relief, and thus to render easily intelligible the distribution of mountains, the water-sheds, the river valleys, and other physical features.

MR. E. B. POULTON has just delivered two lectures at the Royal Institution on "The Nature and Protective Use of Colour in Caterpillars."

PROFESSOR MORREN, the eminent Belgian botanist, has died at the age of 53.

DR. HAAST, F.R.S., Director of the Canterbury Museum, New Zealand, has been appointed Commissioner for the exhibits of that colony, and is now in London, arranging for the exhibition of the geology, fauna and flora, &c., of New Zealand, at the forthcoming Colonial Exhibition.

PROFESSOR STOKES, F.R.S., has been awarded the Actonian Prize of one hundred guineas for his lecture on Light.

PROFESSOR TACCHINI has published the results of his observation of the solar protuberances at the Roman Observatory during 1885. The great protuberances were never seen in the neighbourhood of the poles, but nearly always between the equator and 40°, corresponding almost invariably with solar regions free from spots and faculæ. As regards the protuberances, solar energy may be considered as having been more active in 1885 than during the previous year.

THE analysis of some specimens of the air taken at Cape Horn by MM. A. Muntz and E. Aubin gives the mean result of 20·864, as compared with 20·960, the mean for the atmosphere of Paris. The proportion of oxygen appears to be also very nearly equal to that of the air in various other parts of the globe, so that the variations in the quantities of nitrogen and oxygen in the atmosphere oscillate within very narrow limits.

MR. ARTHUR BENNETT, F.L.S., has published in the March number of the "Journal of Botany" a paper giving the "Recent Additions to the Flora of Iceland."

WE have received Part I. (1883–5) of the "Transactions" of the Leeds Geological Association, containing good abstracts of papers read, and brief accounts of excursions made.

MR. H. E. QUILTER has published a paper in the "Geological Magazine" on "The Lower Lias of Leicestershire," and Mr. Thomas Beesley another on "The Lias of Fenny Compton, Warwickshire," in the "Proceedings" of the Warwickshire Naturalists' Field Club.

WE regret to have to announce the death, although at the advanced age of 85, of Mr. Charles W. Peach, A.L.S., the distinguished collector and observer, who did more in the way of palæontological and zoological discovery than many men of much higher rank in the world of science.

MICROSCOPY.

PREPARATION OF EPIDERMIS. — Would some reader kindly inform me of the best way to procure the epidermis of such leaves as the *Urtica dioica*, as nitric acid is of no use?—*George Rovert.*

MOUNTING POLLEN, ETC.—Can any reader tell me what is the best liquid for mounting the pollen of flowers for the microscope? Also is it best to mount sections of stems of plants in Canada balsam?—*A. Verinder.*

PREPARING INSECTS' BRAINS.—I am desirous of preparing some brains of insects, and I found in an old number of this volume a method given by Mr. E. T. Newton in his paper on "Preparing a Model of an Insect's Brain," in which he speaks of a solution

of hyperosmic acid for hardening, previous to cutting sections. I have tried in vain to obtain this acid in my own town, but the chemists do not seem to understand what it is. I should be very much obliged if some reader could tell me where I could obtain this solution of the strength of $\frac{1}{4}$ to $\frac{1}{8}$ per cent., or if any other medium would effect the purpose. I also want to know how to harden such tissues as stomach, intestine, eye, etc., of insects?—*W. Henry Pratt.*

MOUNTING GIZZARDS.—If your correspondent W. L. Tall (p. 17) will gently pull the head from the body of the cricket, he will find that the alimentary canal and gizzard will come with it. The gizzard must then be cut open, treated with liquor potassæ, and mounted in balsam. Should he not succeed, I should be pleased to prepare one for him.—*J. Moore, 86 Porchester Street, Birmingham.*

CLEANING MICROSCOPIC COVER-GLASS.—I had a large quantity of such covers on hand, and was endeavouring to get the best of them clean again for further use with the usual great waste in breakages, when some one suggested Why don't you boil them in Hudson's Extract of Soap? I never heard of such a remedy, but, as a last resource, I thought I would try it. To my great surprise two strong solutions of this substance, kept at boiling point, quite dissolved all the balsam and cements with which the covers were thickly coated, and I found no further difficulty in cleaning them. This hint may prove useful to many persons who throw away their once used covers, in the belief that, in the effort to clean them, the breakages will be so numerous that "the game will not be worth the candle."—*S. J. McIntire, F.R.M.S.*

LIVERPOOL MICROSCOPICAL SOCIETY.—At the ordinary meeting of this society, a paper was read by Mr. Alexander Barrow, M.B., on the "Development, Structure and Functions of the Eye." The lecturer first described the structure of the human eye, and then gave an account of the development of the eye in the embryo, as exemplified in the chick, etc., and concluded by explaining the optical functions of the eye, its power of accommodation to light, distance of objects, etc. etc.

NEW WORK ON THE ROTIFERA.—No work in natural science has been wanted more than one on the Rotifera or wheel-animalcules. These objects are so common everywhere, and so beautiful, that it is surprising their systematic study has not been taken up before. Perhaps it is as well such has not been the case, for both the hour and the men have now arrived. No other naturalists could have been better selected for such a work than Dr. C. T. Hudson and Mr. P. H. Gosse, F.R.S. Both these men have long been working at the subject independently of each other, but fortunately they have been brought together, so that their combined labours are now appearing in a magnificent work to be completed in six parts at 10*s.* 6*d.*, and published by Messrs. Longman. Parts I. and II. are before us, and they fully realise all that has been anticipated. This work on the Rotifera promises to be a fitting companion to Saville Kent's "Manual of the Infusoria." Each part contains forty pages of text, and two uncoloured and five coloured plates, all crowded with figures. The latter are exquisitely drawn and tinted, and every detail of structure is carefully represented. Altogether, we may say of the present work that it is one which gives us a genuine pleasure to recommend to our readers. So far as the two parts already published go we have six chapters, which are as follows: 1st, Introduction to the study of the Rotifera. 2nd, The history of the literature concerning the Rotifera. 3rd, On the classification of the Rotifera. 4th, On the haunts and habits of the Rotifera. 5th, Floscularíadæ. 6th, Melicetadæ. The illustrations are devoted to the species of these two orders.

NEW SLIDES.—We have received a charming object for microscopical examination from Mr. Fred Enoch, in the shape of an ichneumon fly new to Great Britain, *Utetes testraceus*, which was bred out of a dipterous fly, in whose body the eggs had been laid. Both with polarised light and by means of the paraboloid, the muscles and general structure show very plainly.

ZOOLOGY.

HYALINA DRAPARNALDI.—Mr. J. H. James has lately sent me specimens of this species from Truro, Cornwall, thus adding another county to the known distribution of this species. He has also sent *H. glabra*, *H. alliaria*, *H. cellaria*, *H. nitidula*, and *H. crystallina* from the same locality, as also many other interesting shells concerning which a report will be sent in to the Practical Naturalists' Society in due course.—*T. D. A. Cockerell.*

ABNORMAL AMŒBA.—Referring to Mr. E. C. Bousfield's communication in March SCIENCE-GOSSIP, there is no doubt in my own mind that the organism I described in the January number of your journal was a true Amœba, and not a plasmodium of one of the Myxomycetes. I had ample opportunities for testing this during the fortnight I had it under observation. Its behaviour towards other smaller Amœbæ, the absence of cyclosis (Kent), and the obscurity of its contractile vesicle (which in the Myxomycetes are numerous) all point to its not being a Myxomycetan. I had previously compared it with Kent, and have since with Prantl and Vine, and my first view is confirmed. My only query is to which species of Amœba it belongs.—*E. B. L. Brayley, Clifton.*

PROVINCIAL SOCIETIES.—The *Transactions of the Hertfordshire Natural History Society and Field Club*, vol. iii., part 7, contain (besides meteorological papers relating to Herts), an important one on "The Nests and Eggs of Birds," by Henry Seebohm, F.L.S.; and the List of Lepidoptera observed in the neighbourhood of Hitchin and Knebworth, Herts, by John Hartley Durrant. The catalogue of the Library of the Society (compiled by Mr. John Hopkinson, F.L.S.) has been published. It shows a capital collection of scientific books and pamphlets, admirably arranged, with list of authors, &c. The *Transactions of the East Kent Natural History Society* have commenced with a new series. The twenty-eighth Report for last year shows a flourishing state of things; and it also contains a capital list of books and periodicals. Among the abstracts of papers in the *Transactions* are one on "Teredo navalis," by Mr. S. Saunders; "On the connection between Plants and Animals," by Mr. G. Dowker F.G.S.; "The Cypris Clay of the Weald," by Capt. Mc Dakin; "Stephanoceros Eichornii," by Mr. T. B. Rosseter; "Popular Names of British Plants," by Mr. G. H. Nelson, F.G.S.; "The Marine Aquarium," by Mr. S. Saunders, etc., besides local and general "notes" by the members. The *Proceedings of the South London Entomological Natural History Society* for last year contains the address of the President (Mr. R. South), and also a paper by him "On Protective Coloration of Lepidoptera;" besides which there is a series of entomological notes of exhibits at meetings, etc. The *Victorian Naturalist* is the Magazine of the Field Club of Victoria, Australia. The last number (9) contains papers on "The Fungi of North Gippsland," by Mr. H. T. Tisdall, F.L.S; "A Collector's Trip to North Queensland," by Mr. A. W. Coles; and a "Geological Sketch of South-Western Victoria," by Mr. J. Dennant.

BOTANY.

LEAF-BLOOM AND STOMATA.—Mr. F. Darwin recently read a paper before the Linnean Society "On the Relation between the Bloom on Leaves and the Distribution of the Stomata." "Bloom" on leaves is used by him to mean the coating of minute particles of a waxy character, which is removable by hot water or ether. But gradations occur, from a distinct and appreciable greasiness, throwing off moisture, to such as are easily wetted. A large series of leaves of different groups of plants have been studied by him, and for convenience in the analysis of data he has divided them into four classes. Leaves of Class I. are devoid of bloom on both surfaces, and yield 54 per cent., which have no stomata on the upper surface. In Class II. bloom is deficient above, but present below, and 83 per cent. of the stomata are on the leaves' lower surface. Class III. possess bloom on the leaves above, but none inferiorly, and 100 per cent. of these have stomata on the upper surface. Class IV. have leaves with bloom on both surfaces, 62 per cent. of them having stomata above. From such analysis and other facts and data given, Mr. Darwin concluded that the accumulation of stomata accompanies that of bloom, and, other things being equal, that it is functionally protective against undue wetting by rain, and injury to the leaf tissue.

CARDAMINE PRATENSIS, VIVIPAROUS.—I have never seen a plant of the normal single form of this flower that was viviparous, but I believe the so-called *double* variety invariably reproduces itself in this manner, new plants springing from the leaves where they bend down so as to touch the ground. For the information of those of your readers who may not have met with this variety in flower I will mention that it has single blossoms, out of the centre of which —sometimes directly, sometimes on a tiny stalk— springs a bud that opens into bloom only as the lower petals begin to fade. Your first thought on seeing it is that some child has been there just before you, and has stuck an unopened bud inside each flower for fun. There may be other forms of this double variety, but I have not myself met with them.—*G. E. Dartnell.*

PROLIFERATION OF CARDAMINE PRATENSIS.—I have for several years cultivated *Cardamine pratensis* (the common wild form) with a view to watch the process of proliferation from the leaflets, and my observations have led me to suspect that this process, so far from being exceptional, as is commonly supposed, is more likely the usual method by which the plant is propagated. A plant on my lawn, which has had no chance of flowering, has spread in a few years over several square feet. Another plant, in a border, which has not yet flowered, has surrounded itself with several young plants, one of which I last year found still connected with the parent by the withered midrib of a leaf. In that case the proliferation had taken place from a leaflet of a prostrate leaf, and the new plant had rooted in the soil without separation from the parent. In other cases the proliferous leaflet becomes disarticulated and falls. In others again it remains on the parent plant; and the young plant, failing to reach the soil with its rootlets, perishes. The favourite site of proliferation is close to the base of the leaflet, at the point where the first pair of veins come off from the midrib, and in this situation a careful scrutiny will often detect minute tubercles, which represent the first stage of proliferation, and which may or may not develop into young plants. The process of proliferation is greatly helped by damp, and is best observed on plants kept under glass.—*G. F. Burder.*

PLANTS FROM THE ISLE OF WIGHT.—I beg to thank Mr. Warner for his note in the March No.

(p. 69). The white Cephalantheras (Epipactis, Sow.) could hardly be mistaken for *E. palustris* (marsh helleborine). The only doubt with regard to the plant under consideration can be whether it is the *C. grandiflora* or *C. ensifolia?* I believe it to be the latter, because of the narrow leaves and minute bracts; at the same time I only have the dried specimen as forwarded to me. I have before me a series of both species, gathered at Raveno, Maggiore, some years ago. The leaves of *C. grandiflora* are so much broader and the bracts more prominent than with *C. ensifolia*; the flower-spike of the latter is smaller, with a few loose flowers. But when I come to study the whole series, some variety is noticeable in the different specimens; the two species appear to run gradually into each other. As a matter of fact I believe neither *C. grandiflora* nor *C. ensifolia* have been recorded from the Isle of Wight. "Woods of the Undercliff" was a near enough locality for my purpose, but I may add the information that the character of rock is chalk marl at the precise spot. May I take this opportunity of stating that the rare Swertia was found in the north of England last summer? I dare not say more, except that I saw it, and that it shall not be exterminated through me.—*C. P.*

GEOLOGY, &c.

The Cambridgeshire Chalk.—An important paper on this subject has just been read before the Geological Society by Mr. W. Hill, F.G.S. The author, giving a description of the Middle Chalk seen in the cliffs east and west of Dover, stated that the grit bed of Mr. Price, though much thicker, had all the appearance and structure of the Melbourn Rock, and this, with less hard, but still nodular, chalk above, appeared to be the equivalent of the zone of *H. Cuvieri* in Cambridgeshire. The zone of *Terebratulina gracilis* is well marked in the Dover cliffs, and is equal in thickness to that zone as described in the Cambr. Mem., viz., 150 feet. Above this zone the chalk became harder, withered, with lumpy projections, and finally passed into a series of rocky layers, separated by courses of softer chalk, containing, however, hard crystalline lumps. The passage to this rocky chalk was marked by the occurrence of *Holaster planus* (zone of *H. planus*). The rocky layers, extending upward of 80 feet, were marked by the presence of numbers of Micrasters, "Chalk with many Micrasters" of the author. His division included all the nodular chalk of Dover, the "Chalk with many Organic Remains" of W. Phillips, and in it were found the fossils recorded as peculiar to chalk rock in the Geology of Cambridgeshire. It appeared divisible into two zones; the lower 15 feet, with *Micraster breviporus* (zone of *M. breviporus*) may be considered by some to be an extension of the zone of *H. planus*, the form which marks the passage from the soft to the hard chalk. In the remainder *M. cor-testudinarium* was common (zone of *M. cor-testudinarium*). Seen in thin sections under the microscope, the structure of the hard beds which mark the limits of the Middle Chalk was stated to be very similar. In conclusion, the author considered that the divisions of the Middle Chalk, as set forth in the Cambr. Memoir, are well shown in the cliffs of Dover; but the hard beds, which appeared to him the equivalent of the Chalk Rock, and mark the upper limit of Middle Chalk, attaining a great development at Dover, it became necessary to examine the palæontological position of that bed, to which the name "Chalk Rock" was given by Mr. Whitaker. Having studied Mr. Whitaker's description given in the "Geology of the London Basin," and the exposures of this rock between Cambridge and the Thames, he drew the conclusion, that there was probably more than one bed to which the name Chalk Rock might be applied, and that these, probably not all persistent, may occur at different palæontological horizons. He therefore proposed to take the zone of *H. planus* as the top of the Middle Chalk; although this zone was difficult to identify inland, from the paucity of its fossils, the base of the overlying zone was well marked by the abundance of Micrasters and other forms, which appeared to him more closely allied to Upper than to Lower Chalk. He believed that while the Chalk Rock seen at Henley may be considered the summit of the Middle Chalk, the Chalk Rock of Cambridgeshire, though convenient for marking the summit of the Middle Chalk of that county, included that which was really the upper part of the zone of *H. planus* and the base of the true Upper Chalk, the equivalent of Chalk with many Micrasters of Dover. He would therefore consider the Middle Chalk of Dover to be that included from the base of the grit-bed to the summit of the zone of *H. planus*. Its thickness was 242 feet at Shakespeare's Cliff.

The Geologists' Association.—No. 4 of vol. ix. of the "Proceedings" of this society is published, containing accounts of no fewer than seventeen excursions. These accounts are always well, although sketchily, written, and many of them are illustrated with diagrams of the geological sections of the districts visited. These excursions begin at Easter and last till August, and are usually taken on Saturdays and Bank Holidays; but in July there is a week's holiday to some special place of geological interest at a distance, when large gatherings of members usually attend, so that the "long excursion," as it is called, is one of the most delightful of summer holidays. The monthly meetings are held from November to July inclusive, when papers are read on subjects relating to geology, followed by dis-

cussions, in which any member may take part. The papers sometimes take the form of lectures or demonstrations upon general questions of geological importance, or upon certain groups of fossils; being always well illustrated by maps and diagrams, they are thus of interest to all students of geology. The methods adopted by the Association are well adapted to meet the requirements of those who may, for the first time, be directing their attention to geology; whilst the experienced geologist will be enabled, both at the meetings and excursions, to add to his own knowledge and impart it to others. The work of the Association must especially commend itself to students of science classes, or to those attending the University Extension Lectures. Whilst laying much stress on the practical means of acquiring a knowledge of geology, the Association does not underrate the assistance to be derived from books; and accordingly have acquired, for the use of members, partly by purchase and partly from gifts, a good geological library, which is ever increasing. The library is open for the exchange of books on the evenings of meeting. By permission of the council of University College, the members of the Association hold their meetings in the spacious library of the College, thus enabling them to carry on their work with a very small subscription from members, the services of the officers being entirely honorary. Members pay an admission-fee of 10*s.* and an annual subscription of 10*s.*, or a composition-fee of £5. They receive free by post the "Proceedings" and "Monthly Circulars," and can obtain other publications of the Association at a reduced price from the Secretary.

"BRITISH PETROGRAPHY."—Part 2 of this noble work is even more attractively turned out than the first. The work will be completed in twenty-five parts. The present plates show augite-picrite, hornblende-picrite, beautifully coloured, with key-plates for the same. The text deals with the microscopical structures of igneous rocks generally. We congratulate Mr. Teall on the rapid success of his undertaking.

NOTES AND QUERIES.

THE SHARD-BORNE BEETLE.—There is no reason to suppose that any particular species is referred to either by Collins in his "Ode to Evening" or by Shakespeare in "Macbeth," "Cymbeline," and elsewhere, although the former is probably describing *Melolontha vulgaris*, or perhaps *Geotrupes stercorarius.* "Shard" is derived from the Anglo-Saxon, "sceard," meaning a fragment, e.g. of pottery, and is hence applied to the wing-case of a beetle.—*Sydney C. Cockerell, Bedford Park.*

VENUS CHIONE VAR.—Among other shells brought me from Gibraltar by my friend the Rev. J. W. Horsley was a pale grey variety of this species, corresponding in general appearance to the *var. cinerea* of *Mactra stultorum.* It entirely lacks the usual element of reddish-brown in its colouring. If it should prove to be undescribed, *cinerea* would be a suitable name.—*Sydney C. Cockerell, Bedford Park.*

ABNORMAL AMŒBA.—Referring to the enormous Amœba found by Mr. Brayley and described in SCIENCE-GOSSIP for January, I beg to say that one day when pond-hunting in a moat which surrounded my garden at Upminster I found a dozen or more organisms exactly like the one which Mr. Brayley describes. I took some of them in a bottle to the Royal Microscopicai Society, and asked the Assistant Secretary to find out for me what they were. This, however, he was unable to do; and I then sent some to the late Dr. W. B. Carpenter and asked him to solve the problem. He replied that he believed them to be the spores of one of the Myxomycetes, which are figured in their amœboid condition at page 388 of the last edition of "Carpenter on the Microscope;" the description is as follows: "Here and there offshoots of the protoplasm are projected, and again withdrawn, in the manner of the pseudopodia of an Amœba; while the whole organism may be occasionally seen to abandon the support over which it had grown and to creep over neighbouring surfaces, thus far resembling in all respects a colossal ramified Amœba." In one of Professor Huxley's "Lay Sermons," entitled "On the Physical Basis of Life," is the following: "There is a living body called *Æthalium septicum*, which appears upon decaying vegetable substances, and in one of its forms is common upon the surfaces of tan-pits. In this condition it is to all intents and purposes a fungus, and formerly was always regarded as such; but the remarkable investigations of De Bary have shown that in another condition the Æthalium is an actively locomotive creature, and takes in solid matters, upon which apparently it feeds, thus exhibiting the most characteristic feature of animality." Sachs' "Text-book of Botany," p. 276, has the following: "When a spore is saturated with water it opens, and the whole of its protoplasmic contents escape as a roundish naked mass; but after some minutes it assumes another form, becomes long and pointed at one end, where it is provided with long cilia; it has in fact developed into a swarm-pore, which is either endowed with rotatory motion or creeps along, changing its form like an Amœba." Prantl and Vine's "Text-book of Botany" has the following at p. 31: "Naked primordial cells, as, for instance, swarm-pores and antherozoids, swim about in the water in which they live, rotating at the same time on their own axes. The so-called plasmodia of Myxomycetes exhibit an amœboid movement; that is, the naked mass of protoplasm continually changes its outline, new protrusions are thrown out from the central mass, whilst others are withdrawn, and it thus moves slowly from place to place; at the same time a rapid motion of the granules within the mass is going on." I would suggest to Mr. Brayley that it is possible his find may be of the same character as mine.—*J. C. Havers, F.L.S., F.R.M.S.*

STARLINGS.—Huge flocks of starlings (*Sturnus vulgaris*) were seen every evening during the month of November, flying toward the west. They flew at a great altitude, and from a distance looked like immense clouds. Every morning they could be seen returning towards the east, when they kept close to the ground, rising a little to clear the hedges and other obstacles which lay in their way, but dropping as soon as they passed them, just skimming the face of the land in their rapid flight. The morning flocks were very much smaller than those seen in the evenings, and, instead of huge dense masses like the

evening flocks, they formed irregular wave-like chains about half a mile in length, and from ten to fifty yards broad; one such flock passed every three minutes for one hour. Query—Where did they lodge at night, and how far did they spread towards the east during the daytime? I remarked the last flocks came in sight about nine o'clock, and settled in the fields about this neighbourhood (Ponsanooth), where they remained during the day, and departed towards the west in the evening without joining the large flocks which came from the east.—*S. H. Davey, Ponsanooth, Cornwall.*

A BRIGHTON GARDEN.—Your correspondent, G. Davis, in his interesting article on "A Brighton Garden," describes it as being only fifty square yards in extent, which is only ten yards by five, or about the size of a "good-sized" dining-room. In this are several free-growing conifers, firs, and others. I think that perhaps "fifty yards square" might be intended, and yet that would scarcely require so definite a description. With regard to the growth of the various trees, etc., it is interesting to compare it with that of the same plants under the very different conditions of this neighbourhood. *P. austriaca*, *P. Cembra*, *P. excelsa* do well, but *P. insignis* will not stand the winter's cold. *Picea Nordmanniana* does well for a time, but *Picea nobilis* does better. *P. pinsapo* in sheltered situations succeeds well for a time, but is caught by a cold winter. *P. lasiscupo* comes into leaf too quickly, and the leaders perish. *Cupressus macrocarpa* is useless, but *C. Lawsoniana* does well, and also *C. gigantea*. The ginkgo succeeds fairly well, but does not grow rapidly. The *Euonymus japonica* is not planted here, as it is liable to get killed in winter. It is needless to proceed further, and many of the shrubs I could not report upon, but I thought you could perhaps forward this to your contributor.—*Wm. Southall.*

FOOD, ETC., OF MACRO-LEPIDOPTEROUS CATERPILLARS.—With a view to a monograph of the larvæ of British Macro-Lepidoptera, would entomological readers kindly help me with descriptions, food-plants, etc., of caterpillars they have observed? Localities of same would be of great advantage.—*F. A. A. Skuse, 36 Campbell Road, Bow, London, E.*

THE BRAMBLING.—The brambling (*Fringilla montifringilla*) has appeared here in some abundance during the past few weeks. It seems to visit this part of Cornwall only in severe winters. A bird-stuffer at Falmouth told me he had several sent him for preserving in 1880–81. I have a male bird in fine plumage in my possession. Bulfinches (*P. vulgaris*) are more than usually numerous. In October and November, especially the latter month, their chief food was a late kind of blackberry. Dock-seed has also come in for a share of their attention. On a mild morning in December I noticed the golden-crested wren taking flies on the wing after the manner of the fly-catcher. Is this usual?—*T. J. Porter, Perranarworthal, Cornwall.*

FLORAL VARIETIES.—In North Wales I once found a pure white specimen of *Geranium Robertianum*. With the exception of the flowers being white, it was exactly the same as the ordinary pink *Geranium Robertianum*.—*M. E. Thomson.*

CUCKOOS.—The following I quote from SCIENCE-GOSSIP, 1881, page 68: "Mr. H. B. Sharpe on Cuckoos.—This well known ornithologist, in a lecture recently delivered before the Birmingham Midland Institution, said: 'The ground-cuckoos, unlike the tree-cuckoos, built their nests, but they were not very far advanced in the art of nest building.'" I should be glad if some correspondent would kindly tell me in what other respect (besides in the building of their nests) tree-cuckoos differ from ground-cuckoos. I should also like to know if the American cuckoos (which Mr. Sharpe in the same lecture said "did not lay their eggs and hatch them all at once, as some English birds did, but would lay them at intervals, leaving the young birds first hatched to hatch the remainder") are of the same genus as the English ones.—*A. Pittis.*

HEDGE-SPARROW'S NEST.—On Febuary 14th a hedge-sparrow's nest, containing four eggs, was brought to me from Hendon. Was not this exceptionally early, considering the severe winter?—*G. Browne.*

MISCELLANEOUS QUERIES.—Will any of your readers answer the following? 1. Do pike pair at spawning time or not? 2. Is a heron conscious of standing on one leg in a profound sleep for hours, with head under wing, other foot hidden in abdominal feathers, or is it merely a mechanical or automatic action? 3. Does a bee fly in circles to and from its hive? if so, why?—*Mark Antony.*

ARION ATER, VAR. ALBOLATERALIS.—It may interest Mr. J. W. Williams (p. 55) to know that I found four specimens of the var. *albolateralis* of *Arion ater* at Kirk Braddan, Isle of Man, during the first week of August, 1885. I also saw several others at Onchan. One specimen of var. *albida*, *Arion ater*, was found at Onchan.—*J. Moore, 86 Porchester Street, Birmingham.*

MIMULUS LUTEUS.—I found this plant in considerable quantities last summer growing on the borders of a stream near Enniskerry, co. Wicklow. Has it been found elsewhere in Ireland?—*J. Grierson, Bray, co. Wicklow.*

THE VIOLET QUOTATION.—The idea touched on in "In Memoriam," xviii., is a very ancient one. The earliest quotation that I can give for it is from Persius—

> "Nunc non e tumulo fortunatâque favillâ
> Nascentur violæ?"—Sat. i. 39.

Next comes Shakespeare ("King Lear"), followed by Robert Herrick with his epitaph on his old housekeeper—

> "In this little urn is laid
> Prudence Baldwin, once my maid,
> From whose happy spark here let
> Spring the purple violet."

Tennyson closes the list. Of these, Herrick undoubtedly drew his inspiration from Persius, while the *ashes* of "In Memoriam" would seem to suggest that the Laureate also had in his mind that *fortunata favilla* of the Roman satirist. As for Shakespeare, I do not myself think that he was indebted to Persius, but rather that he here used the violet chiefly as a symbol, in its shy sweetness and beauty, of so "fair and unpolluted" a soul as that of Cordelia. The origin of the idea may lie hidden away somewhere in ancient folk-lore, or it may simply be that the ashes of the dead have been found to stimulate the growth of this flower. I should hardly consider a grave nowadays to be a likely locality for violets to spring up spontaneously in, though I have seen them flourishing luxuriantly in soil which appeared full of cinders and burnt bones; but it is at least certain that, let the connection of ashes, human or otherwise,

be what it may with our flower, that of the ash-tree is a very close one.

"Thick
By ashen roots the violets blow,

as a later stanza of "In Memoriam" so accurately observes.—*G. E. Dartnell.*

A REMARKABLE ROBIN.—According to a contemporary, there is now to be seen, at the old village cobbler's residence at Framfield, adjoining the village churchyard, a living curiosity in the shape of a robin which was captured on the 25th January. The bird is now caged, and sings delightfully in the true notes of the robin. The plumage consists of a white breast, wings resembling the chaffinch, a white crown, and, more singular still, a white bill, whereas our old English robin carries with him a black one.

ARION HORTENSIS, VAR. SUBFUSCA.—Mr. Williams, speaking of this variety in his very interesting article on the variation of slugs, in the recent number of SCIENCE-GOSSIP, remarks, "This variety has been recorded for Britain, but, I believe, on unreliable authority." I took a quantity of slugs last March on the banks of the Ely, at St. Fagan's, near Cardiff, which I sent to Mr. Roebuck for identification. They were: five *Arion hortensis*, var. *subfusca*; five *Limax agrestis*, var. *sylvatica*, three *L. agrestis*, var. *tristis*; one *A. ater*, var. *nigrescens*, and several Arions difficult to make out, which Mr. Roebuck thinks to be a new species not yet recorded as British. Near the same place I took *H. arbustorum*, *hortensis*, *nemoralis*, *aspersa*, *rotundata*, and *hispida*, *S. elegans*, *C. minimum*, *Zonites nitidulus*, *Z. fulvus* (scarce), and *Coch. lubrica*.—*F. W. Wotton, Cardiff.*

A SUGGESTION FOR SCIENTIFIC SOCIETIES.—I am sure there are many students of nature who would be glad to give the helping hand "An Hon. Sec." asks for in SCIENCE-GOSSIP, vol. xxi. p. 263, and, for my own part, I can lend him two papers on general botanical subjects, with diagrams drawn by myself, if he thinks they would be of service. However, I have another object in writing this note, which is to suggest to "An Hon. Sec." to get the members of his society to take up the cataloguing of the plants, shells, and insects, in all their various branches, that are to be found in his district. I have no idea whereabouts he resides, but I can scarcely think its flora and fauna have already been completely worked out. For, as Gilbert White writes in his "Natural History of Selborne," "All nature is so full, that that district produces the greatest variety which is the most examined." Many local societies in England and America have been thus making lists of what is found within their bounds, and with most useful results. In Ireland, too, the Belfast Naturalists' Field Club, and the Royal Dublin Society, have been doing a like work for the provinces of Ulster and Leinster. And it occurs to me that such a treatment of the natural history of "An Hon. Sec.'s" locality would afford endless themes, as, at meeting after meeting, portions of the various lists were brought forward by the different collectors.—*H. W. Lett, M.A.*

A QUERY FOR TEETOTALLERS.—How is the fact (for a fact it is) to be explained—viz. that if you mix Seltzer water with *whisky*, the usual air- (or gas-beads rather) are seen in the mixture, which remains otherwise quiescent; whereas, if brandy be the spirit employed, great frothy bubbles are produced on the surface of the fluid, which fill the top part of the tumbler which contains it, and have a tendency (like champagne) to overpass the boundary of the rim? It has often struck me as being very curious.—*W. H.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

W. J. HORN.—Your unknown animals are hardly likely to be slugs if they live in water. It is more probable they are some kind of Planarians.

F. W.—The "Journal of Conchology" is an excellent monthly periodical, published at 1*s.*, by Taylor Brothers, Hunslet New Road, Leeds.

A. P.—Besides the article on the Geology of the Isle of Wight in our March number, you will find two capital articles on the geology of that little island in the vol. of SCIENCE-GOSSIP for 1882, entitled "A Week's Rambliug with a Hammer in the Isle of Wight."

F. CHALLIS.—Mr. J. J. Harris Teale's "British Petrography" is coming out in twenty-five monthly parts, price 3*s.* 6*d.* each, and is published by Messrs. Watson, Bros., and Douglas, 92 Great Charles Street, Birmingham.

EXCHANGES.

L. C., 7th edition, offered, 135, 235, 575, 1304, 1482, 1646 *Petasites fragrans*, in exchange for other specimens.—M. Dawber, Les Ruettes Brayes, Guernsey.

WHAT offers for twenty-four fine rock specimens from Australia, named and localised? Wanted, Eocene fossils or geological works.—George E. East, jun., 10 Basinghall Street, London, E.C.

MICROSCOPIC objects for exchange: kidneys of sheep and child, human skin, lungs of dog and sheep, all injected; transverse section of rhinoceros horn, hoof of sheep and horse, section of deal—all good polarizing objects—for other objects. All the above are first-class mounts, the same required in exchange. Send list and sample object to—R. Mason, 24 Park Road, Clapham, London, S.W.

STAVELEY'S "British Spiders," sixteen coloured plates; good specimen of lesser tern, without case. Will exchange for polariscope or offers.—W. Towner, 89 Terminus Road, Eastbourne, Sussex.

WANTED, Stark's "British Mosses" and Lindsay's "Lichens." Will give Austin Flint's "Text-Book of Physiology" (30*s.*) for both, or Kirke's "Handbook of Physiology," (14*s.*) for either.—J. W. Williams, D.Sc., 27 Corinne Road, Tufnell Park, N.

SHALL be glad to correspond with any one in Suffolk, with a view of exchanging specimens of British plants of that District.—William Kirkby, Calverley Street, Leeds.

WANTED, Stainton's "Butterflies and Moths." Will exchange Lyell's "Student's Elements of Geology," last edition, edited by Prof. Duncan (1885).—J. W. Williams, D.Sc., 27 Corinne Road, Tufnell Park, N.

Two good micro-slides for each of the following numbers of SCIENCE-GOSSIP. No. 4, April 1865; 38, Feb., 40, April 1868; 53, May, 57, Sept. 1869; 66 June, 71, Nov. 1870; 74, Feb., 75, March, 1871; 85, Jan., 95, Nov., 96, Dec. 1872; and 126, June 1875.—Saml. M. Malcomson, M.D., 55 Great Victoria Street, Belfast.

BRITISH birds' eggs: will be glad to forward list of duplicates with a view to exchange.—Frank Simpson, Fennymore, Ealing, W.

MICROSCOPIC slides for exchange: kidney of sheep, Congo snake, intestine of cat, rabbit, lung of dog, sheep, liver of pig, lip and gum of Congo snake—all injected and stained—for other well-mounted objects, insects, etc. Send list and specimen.—R. M., 24 Park Road, Clapham.

WILL exchange January part of "Nature," 1885 (clean) for any five back Nos. of SCIENCE-GOSSIP, or January part of "Knowledge." Correspondents wanted in the Highlands and near one of the forests of England with view to exchange notes and specimens.—William James, Esq., Treveneth, Paul, nr. Penzance, Cornwall.

EGGS for others not in collection: wild ducks, jackdaws, moorhens, blackbirds, thrushes, linnets, starlings, whitethroats, robins, greenfinches, yellow-hammers, redstarts, field-larks, nightingales, chaffinches, hedge-sparrow.—G. F. Lund, Marlborough House, Sidcup, Kent.

WANTED, fossils from the London Clay and Woolwich and Reading beds in exchange for fossils from Chalk, Greensand, Wenlock Limestone, coal measures, etc.—Geo. E. East, junior, 10 Basinghall Street, London, E.C.

FOR disposal, the "American Monthly Microscopical Journal," in numbers, unbound, for the years 1882, 1883, 1884 and 1885; also the "Microscope," 1885; and vol. 1 bound, and vol. 2 unbound of "Journal of the Postal Microscopical Society." What offers?—Georg Timmins, Syracuse N.Y., U.S.A.

TWO new excellent objectives by Swift $\frac{1}{5}$ and $\frac{1}{8}$, both in exchange for a good $\frac{1}{8}$ or $\frac{1}{10}$, mutual approval.—E. B. Fennessy, Pallasgreen, Limerick.

FOR disposal a $\frac{1}{25}$ object-glass (really $\frac{1}{30}$) by Powell and Lealand, in perfect working order. Gives 1500 dias. with its eye-piece, and has 167° of aperture. Offers requested.—Dr. Bonsfield, 363 Old Kent Road, S.E.

GOOD histological slides in exchange for good mounts of foreign diatoms, or diatom material from abroad. Send slides or material to Dr. Bonsfield, 363 Old Kent Road, S.E.

GOOD series of British land, freshwater and marine shells wanted for a small public museum. The commoner species are especially needed, in all stages of growth. Can offer *C. biplicata* and many local species in exchange.—S. C. Cockerell, 51 Woodstock Road, Bedford Park, Chiswick, W.

WANTED, members for the Scientific Circulating Magazine Society, which offers the choice of three parcels of magazines every month.—T. F. Uttley, 17 Brazennose Street, Manchester.

WANTED, a clutch of eggs, with data, of griffon and Egyptian vultures, honey buzzard, eagle owl, pied flycatcher, oriole, redwing, bluethroat, water pipit, wood-lark, cirl bunting, raven, hoopoe, roller, bustards, thick-knee, storks, crane, bittern, and many others. Clutches of British and American eggs offered in exchange; please send lists to W. Wells-Bladen, Stone, Staff.

"SCIENCE for All," complete, unbound, quite clean: exchange Cole's Studies, with slides, or offers microscopical.—Richard Horton, 8 Draycott Street, Chelsea, S.W.

WANTED, from thoroughly reliable sources, British-taken sets of eggs, viz. marsh warbler, siskin, hawfinch, cirl bunting, corn hunting, chough raven, wood-lark, harriers, buzzard, eagle, hobby, ducks, quail, ptarmigan, spotted crake, stone curlew, Kentish plover, dotterel, phalarope, Arctic tern, roseate tern, divers, grebes.—W. M. Pybus, Solicitor, Post Office Chambers, St. Nicholas Square, Newcastle-upon-Tyne.

"PRINCIPLES of Chemistry, founded on Modern Theories," by Professor Naquet, Paris, revised in English by Dr. Stevenson, Guy's Hospital. Second edition, pp. 848, 1868. Offers in good micro-slides (not anatomical).—H. Epps, 95 Upper Tulse Hill, S.W.

ENTOMOLOGICAL apparatus wanted in exchange for small microscope with forceps, etc.; cost 10*s.* 6*d.*—H. R. Harmer, Withell Villa, Albert Road, Stratford, E.

WHAT offers for a shale (from the South Wales coal-fields) with fossilised fronds of ferns and stem (size 12 × 6 in.)?—George Rees, jun., Glandulas, Lampeter, South Wales.

SCIENCE-GOSSIP, wanted, any No. from commencement to 25, also 30, 43, 46, 51, 52, 55 to 59, 67, 68, 72, 76, 83, 84.—W. T. Taylor, Seymour House, Keswick.

WANTED, two Leclanche cells for electric bell; will give in exchange twelve splendid microscope slides.—P. Kilgour, 11 Stirling Street, Dundee, N.B.

WANTED, for three volumes of "Design and Work" (two vols. bound, one unbound) German works on botany, geology, or entomology illustrated, bound or unbound.—F. W. Weywood, Clement Street, Accrington.

GOOD series of British Mollusca or fossils for early numbers "Quarterly Journal of the Royal Geological Society" or offers. —F. G. S., 2 Polygon, Clifton, Bristol.

WANTED, a good second-hand entomological cabinet; can give in exchange Kirby's "European Butterflies and Moths." First 38 parts SCIENCE-GOSSIP, 1885, unbound, or a variety of side-blown eggs.—A. Kelly, 5 Canal Lane, Castle Terrace, Aberdeen.

SEMELE, Dispar, *M. Artemis*, *C. album*, Galathea, Megæra, Cardui, Trifoli, Filipendulæ, for micro-slides or offers. —W. E. Watkins, 32 Huntingdon Street, Barnsbury, London, N.

By. tentaculata, *Val. cristata*, *Pl. vortex*, *Pl. complanatus*, *Pl. contortus*, *Physa fontinalis*, *L. palustris*, *L. truncatula*, *H. cantiana*, *H. virgata*, *H. ericetorum*, *H. rotundata*, *Cl. rugosa*, *Cy. elegans*. Desiderata: *L. glutinosa*, *L. glabra* and British Vertigos.—Frederick Harding, Shipley House, York Road, Eastbourne.

DUPLICATES, about fifty species of land, freshwater and marine shells from Ceylon and India. List on application. Wanted, land shells of Madeira, and Continental fossils.—J. E. Linter, Arragon Close, Twickenham.

WANTED, Larva of Quercifolia, Fuliginosa, Villica, Plantaginis, Dominula, Betulæ, Sibylla, Paphia, Aglaia, Adippe, Athalia, Maura, Aprilina, Lichenia, Xerampelina, Ferruginea, Gilvago, Ceragio, Flanago, Fimbria, Rufina, Rubiginea; also imagines, duplicates numerous and good; also stuffed birds.—J. Bates, 10 Orchard Terrace, Wellingborough.

WANTED, shells, fossils, minerals or foreign stamps, in exchange for books and stamps.—H. L. E., 7 Barrington Road, Liverpool.

Limnæa peregra, *palustris*; *Bythinia tentaculata*; *Planorbis vortex*, *complanatus*, *contortus*; *Helix virgata*, *caperata*; *Clausilia rugosa*, etc. Desiderata: *Unio margaritifer*; *Limnæa auricularia*; *Clausilia biplicata*, and others. —John D. Morris, 66 Seaside Road, Eastbourne.

OFFERED elementary and advanced text-books of mathematics, chemistry, physics, etc., in exchange for botanical micro-slides or specimens, or works on botany.—W. S. Harrison, M.A., 15 Park Place East, Sunderland.

FIRST six vols. SCIENCE-GOSSIP, bound in cloth, splendid condition. Westropp's "Archæology," Hawkin's "Ichthyosauri and Plesiosauri," large folio, 30 plates, Fosbroke's "Ancient Costume," and a number of valuable architectural works, for Rogers' "Italy" and Poems, works illustrated by F. O. Morris, Bewick, Alken, Cruikshank, Rowlandson, first editions of Dickens, Ainsworth, Lever, etc.; uncut copies only taken of latter.—P. Payne, The Borough, Hinckley.

WANTED, the first six vols. of SCIENCE-GOSSIP bound or in parts; will give good value in microscopic slides, various, or unmounted sections and materials.—John J. Andrew, L.D.S., Eng., 2 Belgravia, Belfast.

WANTED, first-class botanical and anatomical slides, also diatom slides (selected), and good unmounted material of all kinds, in exchange for entomological preparations, mounted.—C. Collins, Bristol House, Harlesden, N.W.

WANTED, good specimens of Limnæa, Planorbis, Amalia, Limax and Testacella. Good exchanges given in other land and freshwater shells.—F. G. Fenn, 20 Woodstock Road, Bedford Park, Chiswick, W.

WANTED, microtome and section knife, also Valentine knife; good exchange given in first class micro-slides, viz. parasites, Insecta, diatoms, animal hairs, feathers, botanical, etc.—W. S. Anderson, 7 Granby Street, Ilkeston.

OFFERED, *C. tridens*, *Bulimus acutus*, *Sphærium corneum*, var. *flavescens*, *H. rufescens* var. *alba*, *Zonites excavatus*, *H. sericea*. Wanted, *S. ovale*, *P. corneus*, var. *albinos*, *H. lamellata*, *Bulimus montanus*, *Limnæa glutinosa*, *Limnæa peregra*, var. *Burnetti*.—Rev. W. Eyre, Swarraton Rectory, Alresford, Hants.

SCIENCE-GOSSIP for '72, '73, '74, '75, complete and bound in two vols.; Gosse's "Evenings at Microscope," nearly new; "Little English Flora," with 280 small but accurate engaavings. Wanted, Taylor's "Half Hours in Green Lanes," and any advanced book on birds.—J. H. Keen, 18 Church Street, Spitalfields.

THE indigenous official plants and their allies beautifully mounted on cardboards, classed and named, only 7*s.* 6*d.* or exchange.—H. Higginson, Newferry, Birkenhead.

BAXTER'S "British Flowering Plants," containing a beautiful coloured drawing of each genus, natural size, over 500 plates, and many thousand of coloured dissections, and two pages of letterpress to each drawing; very scarce, six vols. published at ten guineas, will be sacrificed for four guineas or exchange. —H. Higginson, Newferry, Birkenhead.

BOOKS, ETC., RECEIVED.

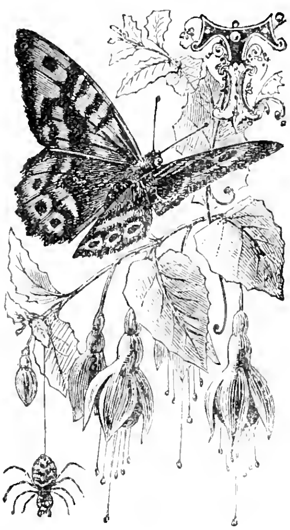
"Mind-cure on a Material Basis," by Sarah Elizabeth Wood (Boston: Cupples & Co.).—"Handbook of Mosses," by J. E. Bagnall (London: Swan Sonnenschein & Co.).—"Rudiments of Chemistry," by Temple Orme (same publishers).—"History of the German Language" (same publishers).—"Kafir Folk-Lore" (same publishers).—"The Rainband," by J. Rand Capon (London: E. D. Stanford).—"Catalogue of Palæozoic Plants" by Robert Kidson (London: British Museum).—"British Petrography," part 2, by J. J. Harris Teall, F.G.S.——"The Scientific Enquirer."—"The Journal of Conchology." —"The Illustrated Science Monthly."—"The American Florist."—"The American Monthly Microscopical Journal." —"Bulletins of the U.S. Geological Survey," Nos. 7 to 14. —"The Botanical Gazette."—"Cosmos."—"Science."—"The Amateur Photographer."—"Ben Brierley's Journal."—"The Rochdale Field Naturalists' Journal."—"Feuille des Jeunes Naturalistes."—"Notarisia, Commentarium Phycologicum." —"The Garner."—"The Naturalist."—"The Midland Naturalist."—"Journal of the Quekett Microscopical Club."— "The American Naturalist." &c. &c. &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM: G. C. E.—F. C. F.—S. J. McI.—H. G.—W. A. T.—W. A. H. —W. J. H.—A. C. P.—W. J. H.—R. S. M.—J. H.—G. F. H. —Rev. T. R.—A. V.—G. R.—S. C. S.—P.—G. F. B.— E. B. L. B.—T. D. A. C.—F. W.—W. S. P.—Dr. J. F.— F. A. P.—C. C. A.—W. A. H.—G. F. L.—G. J.—F. E.— M. D.—I. G.—C. C.—J. W. W.—W. T.—E. B. T.—W. B. G. —H. B. U.—R. M.—G. B.—C. M. V.—W. K.—M. A. H.— J. M.—J. H. H.—S. C. C.—G. E. E.—W. F.—S. M. M.— J. W.—W. M. P.—G. E. D.—J. B.—D. B.—H. E.—W. F. C. —H. R. H.—W. T. T.—P. K.—W. H. W.—H. D.—G. R. jun. —F. H. H.—F. W. W.—H. P. M.—E. W.—E. S. C.—W. E. W. —F. H.—W. H. K.—A. K.—J. D. M.—F. G. F.—Dr. B.— C. C. jun.—F. W. W.—A. B.—C. P.—T. F. U.—W. W. B.— A. P.—W. H. P.—W. E. H.—W. H.—H. L. E.—W. R.— W. S. H.—W. O. J.—I. A.—P. P.—J. E. L.—J. H. T.— W. S. A.—W. L. W. E.—Rev. I. H. K.—H. H.—&c. &c.

ON ANIMAL BEAUTY.

By Dr. P. Q. KEEGAN.

[*Concluded from p.* 74.]



THE beauty of animal movement is essentially connected with the suppleness of the joints. The complete, well-oiled flexibility of the joints is absolutely essential. The lighter the limbs are, the more easily can they be bent, and their movements will be more graceful and beautiful. The movements of the cartilaginous fishes—the sharks, dog-fishes, etc.—are perhaps as graceful as those of any animal; and therein we see the effect of powerful muscles acting on a very light and soft skeleton, abundantly provided with joints easily flexible. Gymnasts are fully aware of this connection between suppleness and beauty of motion; for in order to attain this latter quality they practise what are called *free* exercises, i.e. exercises specially adapted to supple the joints and to extend their sphere or function. There can be no doubt that a well-formed and so far beautiful limb is more easily and gracefully moved than a fat or ill-shaped one, and in this way some connection between the beauty of form and the "poetry" of motion may be traced; but the latter does not depend so immediately or indispensably as the former upon symmetrical growth, perfect development, and the oxygenating vitality of the organic fluids. Nevertheless, we believe that there is scope here for superiority or prevalence of intellect. Many movements considered to be beautiful are so through the operation of the association of ideas, i.e., because we discern therein indications of practical ability, or some sort of taste for neatness of execution and finish, etc.; and in this sense it seems to be true, that the beauty of movement is connected (as aforesaid) with forces strictly mental. Many of man's movements (as in stage-acting, for instance) are, as it were, artificial, and performed with consciousness and attention either to itself, or to the end thereby sought to be attained. This sensitive, conscious attention is so far distracting, and induces a more or less awkward and ungainly result. The motions of the lower animals, on the other hand, are, we believe, almost invariably performed spontaneously or impulsively, and of course easily, gracefully, naturally, and without a particle of oddity.

Finally, the beauty of animal expression remains to be considered. This is connected with the highest powers of intelligence and with the more elevated and spiritual of the emotions, and for this reason it is eminently, if not exclusively, characteristic of man. In fact, as pointed out by Sir C. Bell, there are certain muscles in the human face which subserve no other purpose than that of expression. Among the lower animals the more sensual or organic passions (such as rage, terror, hatred, jealousy) are expressed with extraordinary intensity and ferocity, not merely by the face but by the whole body; and the counterparts or opposites of these passions (viz. joy, confidence, affection, etc.) seem to be expressed not so much positively as (as it were) negatively. There is, however, little beauty, strictly speaking, in these outward manifestations of animal emotion. Indeed, it is doubtful if any sort of expression ought to be called "beautiful." It is only where, as in man, a frequent repetition of certain kinds of emotions or of certain mental states has stamped certain expressions (such as benevolence, refinement, fire, gentleness, etc.) upon the countenance, that we find a picture sufficiently keen and perceptible to warrant a high æsthetic interest. Among brutes we find little of this permanent expressiveness of countenance. Observe a group of monkeys or of bears, tigers, elephants, etc., and you will opine that their counte-

nances when in repose wear a very similar expression. No doubt we often say of a certain creature that he is very cunning-looking, lazy-looking, etc., but this sort of expression will be found to be very limited. In any case, this particular form of animal beauty is occasioned by a perpetual tincture of mental force permeating as it were the stream of electric or vital energy flowing from within towards the countenance and the other more impressionable parts of the frame; and in man it will be found that it is those mental states that are most characteristically human, elated rather than depressed, and lively within certain limits, whose external manifestations can strictly be denominated beautiful.

THE VARIATION AND ABNORMAL DEVELOPMENT OF THE MOLLUSCA.

Part III.

Terrestrial Gasteropoda (*continued*).

[*Continued from p.* 226.]

HELIX POMATIA.—From the neighbourhood of Caterham I have some spirally grooved specimens, such as may be seen in the British Museum, and also an unusually conical one. Mr. J. W. Williams has found a specimen near Dorking which is probably identical with Jeffreys' variety *albida*. The specimen, which was alive, was of a very pale-yellowish or straw-colour, except where the epidermis had been destroyed, where it was pure white, the colour being due to the epidermis only. The lip of the shell was white. Many varieties of this species have been found abroad; the following are not unlikely to turn up in England:—

Var. *quinquefasciata*, Moq.—Yellowish, with five continuous bands; var. *brunnea*, Moq., brown, with the bands scarcely visible; var. *unicolor*, Westerlund, unicolorous, bandless; var. *parva*, Moq., very small; monst. *sinistrorsum*, Born, spire sinistral; and monst. *scalare*, Chem. (*scalariforme*) whorls partly disunited.

Helix aspersa.—I have found the variety *zonata* near Otford, and at Chislehurst a small variety, a variety approaching *undulata*, and a dark form allied to var. *nigrescens*. A conical variety also occurs at Chislehurst (L. M. C.), and a monstrosity deeply grooved at the suture (S. C. C.).

There is also a variety, which might be called *semi-fusca*, having the band-formula (123)45, all the space between the suture and the situation at the lower edge of the third band being chocolate-brown.

Var. *exalbida.*—I have found this variety plentiful but local at Dartford, and at Warlingham. Chislehurst (L. M. C. and S. C. C.), Dorking (Ashford). Both at Warlingham and at Dartford the specimens were amongst *Clematis vitalba*, and at first sight it might seem that the white colour of the shells served to protect them on account of their resemblance to the white *Clematis* flowers, and had been assumed for this reason; but against this view there are three facts: (1) That a number of broken *exalbida* shells were found under the *Clematis* bushes at Warlingham; (2) that the type form was also present; (3) and that my brothers found var. *exalbida* on *Pteris* in a locality some little distance from any *Clematis*.

I cannot help thinking that it would save a lot of trouble if all white or albino forms were called simply var. *alba*, instead of one being *exalbida*, another *albida*, another *albinos*, or *albina*, and so on; and in the same way other sets of varieties, so to speak, might be named. The following occur to me at the moment—var. *major*, shell one-third larger than type, and var. *minor*, one-third smaller, var. or monst. *scalariforme*, whorls separated, or suture near mouth of shell, forming a specified angle, var. *fasciata*, having one or more bands abnormally developed, as mentioned above, in connection with *Limnæa*. In this connection I may mention three interesting cases of abnormal banding, in which there was banding (when I say banding in these cases, I mean whitish and generally linear bands, possibly due to disease) above the periphery as well as below. The first is in a specimen of *L. peregra* var. *Burnetti*, from Loch Skene, in Mr. Ponsonby's collection; the second is an example of *L. glutinosa*, from Reading, collected by Mr. W. Holland, in my brother's collection, which, should these bands be homologous with the normal banding of *Helices*, would have a formula 12(345), and the third is *Limnæa Langsdorffi*, of which there are specimens in the British Museum.

With regard to albino varieties (which, it must be remembered, are merely varieties of the shell—the animal is normal), it would be interesting to learn whether they are equally abundant in all countries, or whether some districts are free from them, and whether there are any large classes of mollusca in which they never occur.

According to J. B. Dietz, the albino variety of *Helix hortensis* is more common in wet years, and specimens with coloured bands have the growth of the last wet year not coloured. But I certainly think this needs confirmation.

It is extremely interesting to note how a character, which arose as a pathological phenomenon, may, by transmission, become the character of a species, of a genus, of a class, and how what is pathological and abnormal in one form is normal in another; thus, in the genus *Hyalina*:

(1.) *cellaria* has the albino form very rare, and quite abnormal;

(2.) *pura* has it as common as the type; and

(3.) *crystallina* is always albino.

Again, in *Limnæa*, *Bythinia*, etc., decollation is clearly abnormal; but in *Bulimus decollatus* and some other species, it is strictly normal.

T. D. A. Cockerell.

ON THE VARIATION AND CONTINENTAL DISTRIBUTION OF THE BRITISH SLUGS.

By J. W. Williams, D.Sc., &c.

[*Continued from p.* 55.]

AMALIA GAGATES, Drap.—This, one of the most local of British slugs, is found over the greater portion of Europe, existing in France, Corsica, Italy, Spain, Portugal, Algeria, the Canary Isles, Madeira, the Azores, and in St. Helena. The following varieties are known :—

Var. *olivacea* *, Moq. : animal deep grey olive-coloured. My sister has sent me this variety from Stourport in Worcestershire, where *Amalia gagates* seem to be abundant. Moquin-Tandon found it at Tolouse, and Lessona and Pollonera in their monograph describe it as Italian, and coming from Nice.

Var. *plumbeus* *, Moq. : animal blackish-grey, more or less lead-coloured. D'Orbigny found this variety at Toulouse, and it has been recorded from several British localities.

Var. *rava* *, Williams : animal drab-coloured, slightly fuscous, with the mantle of a lighter colour than the back. My sister sent me this new variety from Stourport.

Var. *bedriagæ*, Lessona and Pollonera : animal black with lateral blackish bands on the sole. Bedriaga records this variety from Nice, and Falchi from Sardinia. Italian.

Var. *Benoiti*, Lessona and Pollonera : animal black, keel white. Italian. Lessona found this at Messina.

Amalia gagates has been found in France at the following localities: Vendée (Letourneaux), Charente-Inférieure, Gers (Mabille), Haute-Loire (Pascal), Isère (Gras), Haute-Garonne (Fagot), Maritime Alps (Neville), Hérault (Dubreuil), Agenais, Gironde (Gassies), Vosges (Puton), Rhone (Locard), Basses-Pyrénées (Mabille), Bretagne (Desmers), Le Nord (Norguet), Loire-Inférieure (Caillaud), and by Massot in the Oriental Pyrenees.

Amalia marginata, Müll.—This species is also generally distributed. According to the French literature on this slug, Bourguignat took it from Grande-Chartreuse, Isère, and the Savoy; Mabille and Drouët from Vienna, Gers, Moselle, Côte-d'Or; Dubreuil from Hérault; Fagot from Haute-Garonne; Ray and Drouët from Champagne; Pascal from Auvergne; Massat from the Oriental Pyrenees; and Locard from Ain. According to Lessona the type-form is common enough in Italy. The varieties are :—

Var. *rufula* *, Moq. : animal yellowish-red. French. Moquin-Tandon found this variety at Crouzet Roquefort, and Sarrat.

Var. *rustica* *, Millet : animal greyish, mantle reddish, with a longitudinal black band on each side; shield whitish (= *L. rusticus*, Mill.). Millet records this from the north of Anjou, Bouillet and Thorigné and Lessona from the valleys of the Lombardian and Piedmontese Alps.

Limax flavus, Linn.—This is another generally distributed species. It is said to have become acclimatised in America, where it occurs near Portland, Maine. Two new varieties have been described by Roebuck as indigenous to Britain.

Var. *grisea* *, Roebuck : like the type, except that the ground colour is grey, instead of yellow.

Var. *suffusa* *, Roebuck : grey, unicolor.

Var. *flavescens*, Fér. : animal yellowish, indistinctly spotted. This has been found by Lessona and Pollonera in Liguria, Tuscany, Sardinia, and Sicily. French.

Var. *rufescens*, Moq. : animal reddish, spots very indistinct. Found in France and all over Italy. Not yet described as British.

Var. *maculata*, Moq. : animal brown, with black spots. French. Pini found it at Esino in Lombardy.

Var. *virescens* *, Fér. : animal greenish, spots indistinct. French. Found in Liguria by Lessona.

Var. *tigrina*, Pini : Lessona and Pollonera describe this variety as "flavo-rufescens, nigro-variegatus; clypeo postice ample nigro-maculato; medio dorsi lineam flavo-rufescentem longitudinaliter ferentes, carinam connectentem." Found by its discoverer at Esino in Lombardy.

Var. *colubrina* *, Pini : "flavus, clypeo dorsoque late ac irregulariter nigro-maculato; interstitiis flavis maculas nigras æquantibus." Pini found this at Esino.

(*To be continued.*)

TEETH OF FLIES.

By W. H. Harris.

No. IX.—*ANTHOMYIA PLUVIALIS.*

THIS fly may be taken occasionally in our houses, where it sometimes puts in an appearance along with the ordinary house-fly, but when it does so it is generally looked upon as being indicative of rainy weather setting in at a not very remote period; its natural habitat, however, is out of doors, and it may be taken in various situations.

It is a common but rather pretty species, subject to vary in appearance very considerably; it is known by its spotted appearance, but not infrequently these marks are found to coalesce to such a degree as to very materially alter the design on the thorax and abdomen. "Two of the varieties thus produced have been exalted by Rondani into distinct species, but they possess no real specific distinctions" (Meade, "Entomologist's Monthly Magazine," vol. xix. p. 32).

The general character of the genus to which this fly belongs is given by the same authority as follows: "Eyes bare, contiguous or sub-contiguous in the

males; arista pubescent or bare; forehead and face slightly prominent; epistome often projecting; abdomen ovoid or oblong and depressed, often much

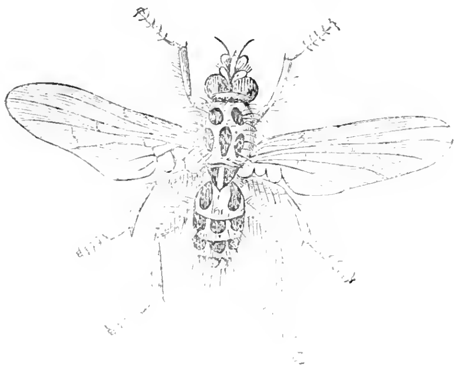


Fig. 61.—*Anthomyia pluvialis* (mag.).

thickened at the apex in the males; alulets rather small, but with the scales unequal in size; wings with the third and fourth longitudinal veins parallel in number and arrangement, and, in a lesser degree, in form also. They are generally larger in proportion to the size of the lobes than in *Musca domestica;* the basal portions of the teeth are broader; the serrated free ends present a more uniform appearance, and the lateral portions of each tooth are more prolonged above the central parts. Notwithstanding the increase of size, they appear to be very delicate in structure, being almost colourless; they require very careful preparation and much enlargement to make them out very distinctly. When these conditions are obtained, a very pretty set of organs is displayed. The following formula describes the groups, viz. 1,1,2,3,3,2,1, or thirteen in each lobe; the two single teeth occupy the posterior, the other single the anterior position in the mouth. The first of the former is of the blow-fly type, all the others being deeply serrated and quite different in appearance.

Although quoting the above as being representative of this species, the preparation of a number of objects for verification revealed the fact, that the above number — though most frequently occurring — was not constant, some specimens ranging as high as

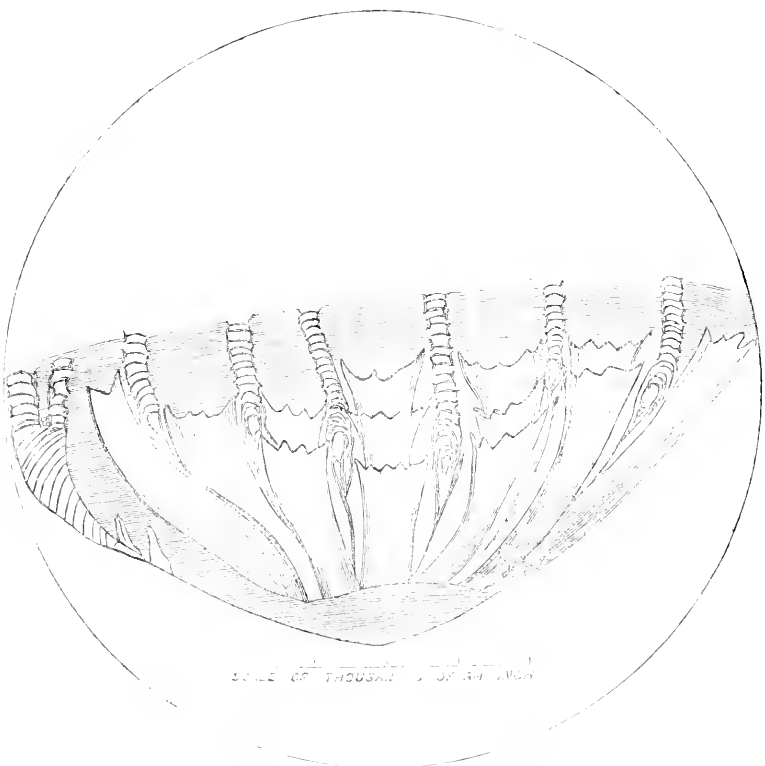


Fig. 62.—Teeth of *Anthomyia pluvialis*.

or slightly convergent at their extremities; anal vein prolonged to the margin; legs always black or grey."

The organs of dentition, although bearing some resemblance to those of the house-fly, differ altogether

four distinct rows in two of the central members of the group. Can there be any connection between this and Rondani's "distinct species" before referred to? If any reader of these notes who has a thorough

acquaintance with the two species, and is sufficiently interested, will kindly forward the writer a few specimens of both, an elucidation of this question may follow. Specimens so sent should be placed in a small tube containing dilute glycerine, otherwise they will be useless for the purpose they would have to serve.

STUDIES OF COMMON PLANTS.

No. V.

THE DANDELION (*Leontodon taraxacum*).

By E. A. SWAN, B.A.

IN selecting this subject for the present essay, I had considerable doubts whether it was possible for me to introduce anything interesting or novel in reference to it. So much has been written and said about all our common plants that it is exceedingly difficult, in writing about any particular one, to throw any fresh light on its structure and development. Take the plant now before us. What botanist is not

Fig. 63. Fig. 64. Fig. 65. Fig. 66. Fig. 67.

familiar with it? And yet I venture to hope that my observations may prove not altogether uninstructive, though they deal with a well-worn theme. If, too, any of my deductions are inaccurate, I have no doubt that some good friend will quickly set me right.

Everybody is aware of the persistence of the dandelion in thrusting itself on their notice. Its extraordinary vitality cannot but be an object of wonder. Its long tapering root, going down deep into the earth, is simple enough; but it has in itself the power of renewing the plant above ground, however frequently that may be cut off. Over and over again the experiment can be tried with the same result; so much so that I am not surprised at the ancients believing, in their ingenuous mode of reasoning, that a plant which was so difficult to kill would tend to give health and strength to those who took it as medicine.

If the bright yellow flower-head be dissected, it will be seen how excellent are all its adaptations; and I have no hesitation in saying that any one who would take the time and trouble to make it a special study would find himself well repaid at the conclusion of his labours. There are two or more whorls of bracts, some of the outermost ones assuming the shapes depicted in Figs. 63, 64, and 65 (evidencing that they are modified leaves), while all the rest are ligulate. Next comes a whorl of perfect florets, each petal constituting the corolla being ligulate, and having on the outside a wide green band extending the entire length, which appears, though narrower, in the individual members of the next whorl, and also, though narrower still, in the next, showing, as far as colour can be any index, the gradual conversion of a bract into a corolla. Then we have whorl after whorl of florets packed together with marvellous closeness. But to particularise: each floret is a perfect flower; corolla five-lobed, joined in a tube at the lower part, standing on a rudimentary calyx, from which spring fine hairs; below the calyx, the stalk surmounting the achene; then the stamens, joined in a tube and five-lobed, the filaments below being affixed to the corolla; inside the stamens the pistil, which is bifid, and has, too, a third of its upper part covered with spines directed upwards. Within the cleft there are minute projections, but I do not know their purpose. Fig. 66 is a representation of a complete floret, somewhat larger than the natural size; it will be noticed by this how minute all the parts are. Fig. 68 represents the

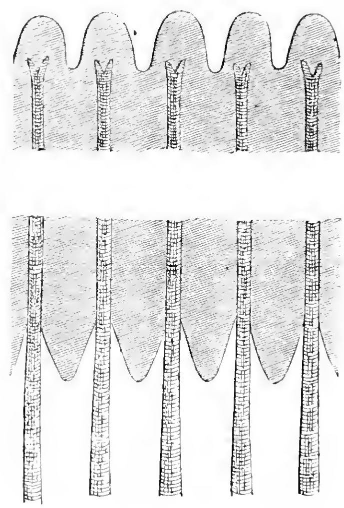


Fig. 68.

upper and lower parts of the stamens and filaments laid open and enlarged, so as to show more clearly the construction. Observe how they are formed, and the angular pieces below. At first the corolla of each floret is closed, presenting a slightly curved tube, as in Fig. 67. It then opens gradually. The order of opening is, first the outermost whorl, then the next, and so on. Fertilisation is effected by means of insect agency, and the method adopted for securing a cross is interesting. Reiterating the fact of the minuteness of the stamens, forming as they do a tube barely as thick as a fine needle, and stating that the pistil fits that tube tightly, it is quite clear that there would be little chance of fertilisation in the way mentioned unless some contrivance existed for furthering that desirable end. Hence, we find the advantage of the spined pistil, the spines, as the

pistil grows upwards and comes to light, positively dragging with them the pollen from the stamen tube, and making it available for the various visitors to the flower. Add to this, that the pistils do not open for some little time after appearing, and we can see how the chances of a cross are favoured.

And what is the purpose of the angular pieces referred to? With some diffidence I venture the opinion that it is for ventilation of the stamen tube, which, owing to its size, could not be effected without some mechanical aid, it being impossible to create a current through so small a space without a special contrivance. The method is this: an insect, in seeking nectar, necessarily thrusts its proboscis against an angular piece and presses it inwards, thus causing a slight displacement of air in the tube, and this, oft repeated, would be sufficient to carry out the end in view. But it may be urged that I ought first to prove that ventilation is necessary before showing how it is effected. This, however, I cannot do. I can only surmise that it would be advantageous to the pollen to have a constant supply of fresh air to keep it vigorous. The angular pieces, it is reasonable to suppose, like any other part of the flower, whether rudimentary or otherwise, subserve some useful purpose; but I am not in the position to advance conclusive evidence for any specific purpose. It is true that a part, in transition or otherwise, may be, as far as we can ever learn, absolutely useless except for enforcing a lesson in evolution; but I do not think we can look upon these angular pieces only in this way, and I believe they are of actual service. Take another instance, the rudimentary calyx: the feathery pappus ultimately aids the seed, by means of the wind, to find pastures new. When the seed settles, as it not infrequently does, on grass, the spines on the hairs and the spines on the achene, pointing upward, act as resisters to the seed being washed up above the surface of the earth when it has once been washed down by the rain through the grass. Otherwise the whole apparatus is so light that it would hardly find its way through close grass to the soil, and, when there, would stand less chance of becoming fixed. With few exceptions, it is generally found that any part, however useless it may at first sight appear, is indispensable to the plant.

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LEPIDOPTERISTS' WORK FOR MAY.

By W. Finch, jun.

WITH the "merry month of May," the lepidopterist's work begins to be almost more than he can manage; indeed he must needs be energetic if he means to grapple successfully with the constantly increasing insect life around him.

Let him not merely satisfy himself by making a collection and amassing specimens, but let him study, and study patiently, intently and well. He will then at the end of the year be in the possession of a collection of notes and a mass of information such as will be both useful to further studies and beneficial to heart and mind. Day by day new and startling wonders will be unfolded to his gaze, and I trust he will not allow them to slip unheeded by. Here in these humble, tiny forms of life he will find much for serious study and meditation; for in the tiniest and apparently most insignificant objects he will find strong proof and forcible evidence of the love, care, and wisdom of an omnipotent God.

Let us see then what we have before us to get through, and then to work with a will. What was said last month concerning ova applies equally to this. My readers should bear in mind that the rearing of insects from the egg or from the early larval stages is far more conducive to perfect specimens and the acquisition of valuable knowledge than any other method. Besides, there is much to be discovered by this means and in this direction. Many larvæ there are of which we cannot be certain as to their proper natural food-plant; therefore every student in this branch should make it his duty to take copious notes of what he sees around him, jotting down from time to time full particulars of food-plants, habits, appearances, and any interesting or striking characteristics that occur to him; no matter how trivial they may seem, put them down.

With regard to larvæ, much is to be done this month. Beating may now be resorted to, for the trees have by this acquired considerable foliage. Hybernated larvæ will be now about full fed, and will be eagerly sought after, as giving comparatively little trouble, soon turning into fine healthy pupæ. Many small larvæ produced from eggs laid late in the spring will also be found, but should not be despised, for they are as a rule free from those parasites to which they are more liable later on. Cannibal larvæ must be carefully sought out and isolated, or they wiil most assuredly devour their brethren. The worst of them is *C. trapezina*, but there are others, as *P. cassinea*, *C. spartiata*, *S. satellitia*, which are quite as bad. Grass-feeding larvæ are now very plentiful. The lantern must still be used for night searching. There are no reliable methods of attracting larvæ to us as we do moths, so we must perforce go after them. Some collectors however recommend lettuce-leaves as a bait, scattered about on the ground some time before collecting.

The essential points in successful larvæ breeding are quiet, plenty of room, fresh air and cleanliness. Therefore let your cages be roomy and well-ventilated. [With our Editor's kind permission, I will write a practical article before long on the "Construction of Larvæ Breeding Cages."] Never allow your larvæ to run short of food, and above all feed from the same plants or trees throughout; do not change about from one tree to another: once you

have fed larvæ from a certain tree, continue from the same. The practice of changing about the food of larvæ is, I believe, together with wet, the source to which most failures in breeding may be traced. Caterpillars invariably thrive best on dry and well-matured foliage. Not much pupæ-hunting will be done, there is too much other and more important work on hand. But still on cold, windy days, one may fill up one's time by examining grass-roots, etc., for on such days other work will be almost impossible.

I must not however forget to mention the Tortrices, a great mass of species of which are now in the larvæ state; rose and lilac, plum and pear and other trees will be swarming with them. These larvæ are best gathered into muslin bags, in which they may be kept in a cool place until the imagos emerge; kept thus they require but little attention. As the food gets dry, fresh may be thrust into the bag without the trouble of removing the old.

Searching for imagos should be most assiduously carried on this month, although we must expect east winds and cold nights. If due diligence be used, however, there will be a fairly good list of captures. It is often up-hill work, though, looking for insects of note, owing to the prevalence of east winds. But still, "patience is a virtue," and no one has better opportunity of proving it than the lepidopterist in May. We have a variety of methods for taking insects this month. "Treacle" will not be much use, indeed it had better be abandoned altogether for a time. "Light" will prove useful; have an eye therefore to the street lamps, and even shop windows in country places. Palings and tree-trunks may now be resorted to, and will be found profitable. With regard to the former, painted fences are of no use, although the moths do not at all mind tar. It is of no use to examine palings after the sun has shone on them long, so the collector must be up and at it betimes; *C. chamomillæ* may thus be taken. The above is also applicable to tree-trunks, although here the moths will often shift around the tree as the sun approaches them. Bushes and shrubs when beaten will surprise the collector by the numbers of insects they had concealed, and which will turn out and take to flight. Moths may be driven out of grass and moss by means of tobacco-smoke. The yew-tree is noted for harbouring moths, and may be beaten with advantage.

Look out for clearwing moths on leaves, especially those of the currant; they are fond of basking in the sunshine. *M. fuciformis* and *bombyliformis*, in meadows near woods, are very partial to the flowers of the common bugle (*Ajuga reptans*). Among broom *C. obliquaria* may be found. Fine sport and much enjoyment may be derived from "sembling" this month, notably with *E. versicolora*, *S. carpini*, *B. quercus* and others. We shall begin work with the net now, too. It is in this month that we may enjoy the sight of those exquisite little creatures the orange-tips (*A. cardamines*). In the woods too we may find *A. euphrosyne* and *L. sinapis*. Avoid windy days for butterfly-hunting. If there be a hedge, always keep to leeward of it, and if sun and wind be opposite so much the better. In conclusion, let me say that I shall always be glad to give any further information to readers of this paper on application.

158 *Arkwright Street, Nottingham.*

CORN MILDEW AND BARBERRY BLIGHT.

EVERY reader probably knows that in old times a belief was very prevalent amongst farmers and agricultural labourers, that barberry-bushes in a hedge were capable of causing the red rust and black mildew of corn. The barberry was not invariably selected as the cause of the mischief; sometimes it was the whitethorn, at other times the blackthorn, or even the buckthorn. At first no good observers believed the rustics, but at length it was pointed out that barberry-bushes were commonly afflicted with an orange-coloured fungus resembling (to the unaided eye) the rust fungus of corn. Because these fungi appeared to be somewhat alike, it was surmised they might be the same with each other; and because it was allowed they might possibly be the same it was decided they were the same, or, if different, only different forms of the same fungus. Primitive "experiments" were soon initiated by placing spores of the barberry blight fungus on to the leaves of corn and spores of the corn mildew fungus on to barberry leaves: the experimenters wished to prove that the two fungi were really the same with each other, and of course they (as they thought) succeeded. What they could not see, and what no one has ever yet seen, viz. an anatomical connection of one fungus with the other, they imagined. Very little attention was paid to these primitive and (as they were performed) ridiculous experiments until Professor de Bary, of Strassburg, repeated them in his laboratory, and gave his adhesion to the idea of the identity of the two fungi. After Professor de Bary had expressed his opinion very little more was said or done, and the majority of botanists on the Continent accepted and taught as truth Professor de Bary's views. Those views have never been entirely accepted in this country, although they have been loudly taught in the schools and extensively printed in handbooks.

I have strongly objected to the supposititious connection of the two fungi, for the following reason (one amongst many others). It is, that corn is so seldom free from red rust, and barberry-bushes are so seldom free from the fungus of barberry blight, that there is never any certainty that both corn and barberry-bush do not possess traces of the disease before the

experiments are concerned. If apparently healthy leaves of corn are taken, and apparently healthy leaves of barberry, and these leaves are microscopically examined, fungus mycelium will be commonly found

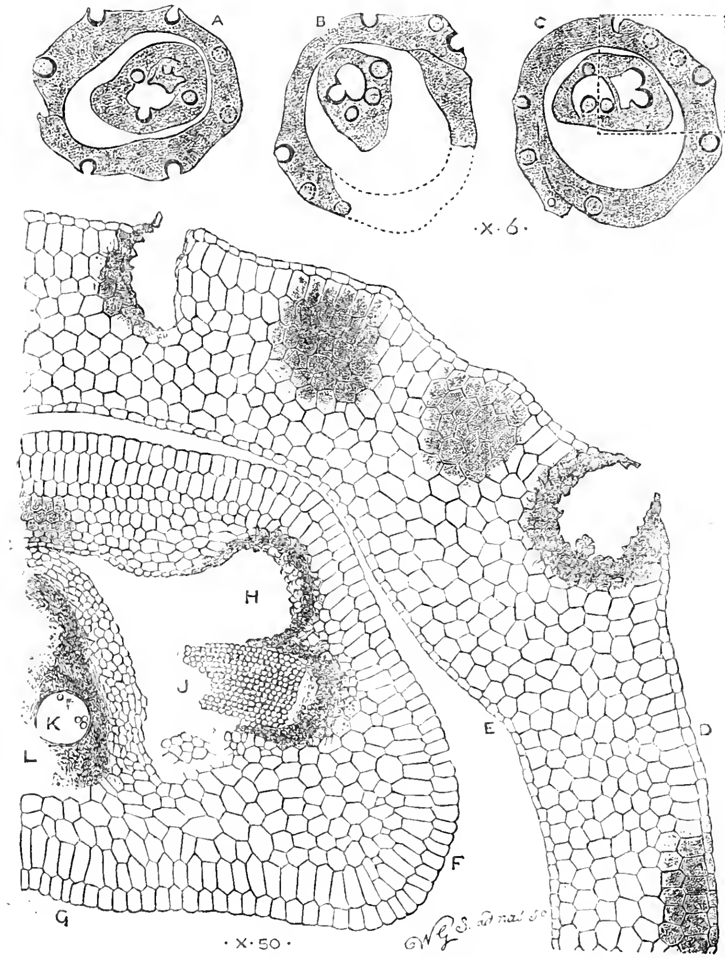


Fig. 69.—*Œcidium berberidis.*

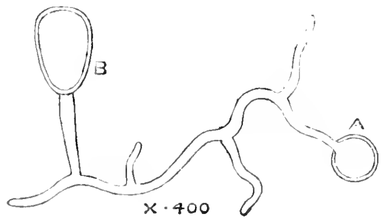


Fig. 70.—Œcidium-spore, producing B; A, Uredo-spore: ideal plan.

inside the leaves. Neither is the mycelium confined to the leaves, for it invades the seeds of both plants, and these seeds are frequently planted with the mycelium in their tissues. A diseased progeny is the result. The disease, therefore, is (I say) hereditary in both plants, and so widespread that it is extremely difficult to get perfectly healthy examples of either corn or barberry. Now, although I have many times recorded mycelium in the seeds, it has been by no means easy to get a record of the *perfect fungi* within the seeds, and to give a distinct proof that the fungi can really reach and perfect themselves within the membrane, or in or on the enclosed cotyledons of the seed.

In the "Gardener's Chronicle" for August 22, 1885, I illustrated and described the perfect condition of corn mildew, *Puccinia graminis*, growing within the unbroken membranes of the seed of oats (Fig. 71), and now, thanks to an obliging correspondent, Mr. George Brebner, of Aberdeen, I am now able to give an illustration of the perfect condition of the fungus of barberry blight, *Œcidium berberidis*, growing upon and within the cotyledons of the barberry. Mr. Brebner forwarded me the living berries with Œcidia within the seeds, and a microscopic preparation from which the accompanying illustration (Fig. 69) has been made.

Mr. Brebner writes as follows: "The sections were made in August 1885, the remarkable feature being that the Œcidium is growing centripetally within the seed. For those interested in the Œcidium-Puccinia controversy any remarks on the bearing of the find would be superfluous. I wish, however, to draw attention specially to the position of the cluster-cups, making it extremely probable that *Berberis vulgaris* is inoculated by its own Œcidium. Further, the position of these Œcidia spores strengthens the theory that they are resting-spores. The sections were the first ever made by me of a barberry seed, and in consequence the following idea forces itself on my mind: 'If a tyro in the science of mycology finds the Œcidium inside the first seed he operates upon, surely this state of matters must be very common!' Mr. Worthington G. Smith and others have found much the same con-

dition of things in other fungi, e.g. the spores of *Puccinia graminis* within the seeds of corn (see 'Gardeners' Chronicle,' August 22, 1885)."

The three sections at A, B, C (Fig. 69), show transparent slices of the fruit of the barberry. The little circles in the outer rind of flesh of each berry are Œcidium cups, some full of spores. The seeds within

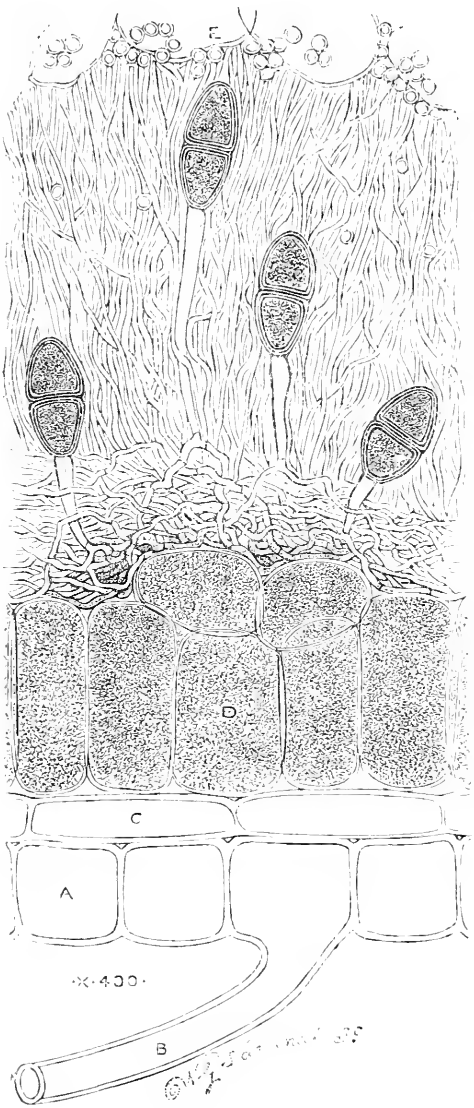


Fig. 71.—Puccinia within the seed of oats.

each berry also exhibit similar Œcidium cups. At the top right-hand corner of C a dotted quadrangle will be noticed. This quadrangle is further enlarged to 50 diameters at the bottom of the illustration. The thickness of the flesh of the berry is shown between D and E, and in this flesh are four Œcidium cups—two empty, and two immersed and partly hidden in the flesh. Part of a seed is seen at F, G, and Œcidia are shown at H, empty, and J, full of spores; an immersed cup, almost empty, is shown at K, and mycelium, etc., at L.

When the seeds both of corn and barberry are less extensively diseased than in the examples here illustrated mycelium only can be seen, but this is easily enough recognised by any one properly acquainted with Œcidium and Puccinia. The mycelia of Œcidium and of Puccinia appear to me to differ from each other.

All experiments are perfectly worthless unless it can be proved with the utmost certainty, before the experiments are commenced, that there is not a scrap of mycelium or a single spore of Œcidium or Puccinia on or in the plants to be experimented with.

Since the connection of barberry blight and corn mildew has been supposititiously established, several other examples of a like nature have been brought forward on worse evidence than in the case before us. Some instances are supposed to be supported by what is no evidence at all. The minor examples can very easily be disposed of. The barberry and corn subject has, however, taken deeper root, but I think it has now been shown that the diseases of the two plants are probably distinct, and that both diseases almost invariably traverse the host plants from the roots to cotyledons within the seeds.

Many fungi bear more than one sort of fruit. It is known that certain fungi bear different kinds of fruit, because the different fruits can be readily seen on the same supporting threads. Until this is seen in the fungus of barberry blight and the fungus of corn mildew, any connection between the two must be considered unproven or improbable. For instance, if any botanist will cause an Œcidium-spore, as at Fig. 70 A, to germinate on corn (these spores germinate with great readiness), and produce from its mycelial thread a Uredo-spore, as at B, the case will be proved, i.e. if the said botanist can permanently preserve his specimen on a microscopic slide, and send it to the British Museum for all comers to examine.

A similar piece of work is very easy with other fungi. It is reasonable, always expected, and is always done if anything is to be proved. Why, then, has it never been done with the fungus of corn mildew? Simply because it cannot be done; and all the writings and illustrations produced in favour of the, at present, purely supposititious connection of the two fungi are not worth the paper they are printed on.

The actual mounted microscopic slides of *Puccinia graminis* within the seed of oats and *Œcidium berberidis* within the seed of the barberry, together with the material from which the sections were made, have been given to the Department of Botany, British Museum, South Kensington, where they may be seen by any one.

WORTHINGTON G. SMITH.

From the "Gardener's Chronicle."

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

The Incubation and Preservation of Soles.—It is satisfactory to learn that the reproduction of the sole is being energetically carried on in France, where a laboratory was established in 1881 by Dr. Joussett, especially for this purpose, and that the ova have been regularly incubated with success. It would be still more satisfactory to learn that the like is being done in this country. But even if this were the case, we should only have taken a preliminary step towards the restoration of the supply of one of the best of our food fishes. In spite of Dr. Huxley and others, who maintain that the action of our fishing is barely measurable in checking the reproduction of fishes, I am convinced that trawling effects a positive devastation of every sole-bank to which it is applied. Any of my readers who doubt this should take a trip in one of our south-coast or other trawlers, and note the efficient sweeping of the sea-bottom by the trawl, which travels along a track as broad as the length of the vessel. More than an acre per hour of the harvest of the sea is thus mown down, and the number of vessels doing this may be counted in thousands. I only speak of the ordinary sailing trawlers. Where steam is applied the effect is vastly magnified. A convincing proof of this destruction is afforded by the fate of the "Silver Bank," which was discovered on our east coast about forty years ago. I remember it well. Soles were retailed in London at twopence per pound, and specimens of enormous size were specially abundant. Gradually the size diminished and the quantity declined; finally the harvest consisted chiefly of "slips;" and now the Silver Bank is practically ruined, and the price of soles has risen about one thousand per cent. in the market. The sole is a small-mouthed fish, with a small stomach and temperate habits. It grows slowly, is better protected against voracious enemies than shoal-swimming fishes, but falls an easy victim to the machinery of man. Therefore it needs especial protection against man, and this might be afforded by prohibiting the sale of slips under a certain size, say six inches in length. All that are smaller may easily be returned alive, as they live out of water a considerable length of time. I have seen them alive six or eight hours after being caught in cool weather.

The Electrical Eel.—In reference to the letter of Mr. Jackson (page 71 of last number) I may add to the testimony there given that I took a shock from the electrical eel that was exhibited in the Adelaide Gallery many years ago. I plunged both hands in the water, intending to grasp the fish, but failed to reach it; received a very severe shock when at some distance, probably three or four inches, the sensational nature of the experiment rendering any approach to accurate estimation of the distance quite impossible.

The Mountains of Denmark.—Denmark is a very flat country, as everybody knows, but a recent discussion among Danish geographers concerning the highest summit of the country indicates a moderation in the matter of elevation which exceeds the estimates of most of us, especially if we translate the name of the Himmelbjerg, which has long enjoyed the distinction of being the king of all the mountains of Denmark. Himmelbjerg signifies the Heaven-mountain, the hill whose summit tops the skies. The Danes are evidently thankful for small mercies in the way of mountains, this great enthroned monarch having an elevation of 147 metres, i.e. 482 feet. It now appears that the Himmelbjerg must abdicate in favour of mightier rivals—must take third place—recent measurements having shown that in the forest of Ky there are two that overtop the heavens, one of them being 163 metres (535 feet) high. "Nature" refers to these as "unnamed heights." They may well be unnamed, as it would be difficult to find a superlative to Himmelbjerg.

Moss in Deep Water.—The limits of life in darkness have yet to be determined. The deep sea explorations have revealed the existence of living animals at depths where *à priori* reasoning had previously led to the conclusion that such life is impossible, and some have supposed that the darkness at such depths is relieved by the phosphorescence of the animals themselves. This, however, does not appear to have been confirmed. These animals probably feed chiefly on the sinking remains of animals and plants that pass their lives near to the surface. M. Bocion, of the cantonal industrial school of Lausanne, has found a bright green moss growing on calcareous rock at the bottom of the Lake of Geneva, at a depth of 200 feet. Although some sensible amount of light penetrates to this depth, the amount must be very small—far less than has hitherto been supposed to be absolutely necessary for the formation of chlorophyll.

The Subjugation of the Phylloxera in France.—Frenchmen of the old school are still proud of the military achievements of their nation. I say "of the old school," having found in the course of my pedestrian wanderings in France that "la gloire," etc., are sadly at a discount among the majority of genuine Frenchmen, i.e. the French peasantry. Parisians I don't count—Paris is not France. A great battle has recently been fought in France, and still rages. The enemy has invaded the country, taken possession of the richest produce of its richest provinces, has held them during about ten

years, and is not yet beaten, though the fight has been heroic, and one of which the whole nation may well be proud, for it has shown all other nations how to deal with similar foes. The best men of science throughout France have done their best to study the habits of the phylloxera, and the means of battling with it. No expense has been spared either by the central or communal governments, and individual peasant proprietors have all co-operated. At present only 500,000 hectares (about 1,250,000 acres) remain in possession of the enemy, instead of more than double that number. The methods of fighting still employed are: first, submersion of the whole of the land until the invaders are drowned—this is the most effective, but is only applicable in low-lying levels; second, carbon bisulphide, which kills effectually both by its direct contact and its vapour; third, potassium sulpho-carbonate. In 1885 submersion was applied to 24,339 hectares; carbon bisulphide to 40,585 hectares; and the sulpho-carbonate to 5,227. Only those who know the amount of skilled labour that is expended upon a hectare of vineyard, with its thousands of sticks to support the vines, can appreciate the devastation that has occurred, the struggle that has so long continued, and the perseverance with which it is maintained. The "commercial depression" of which we are complaining so loudly has been a mere flea-bite compared with the ruin of the greatest and most profitable of all the industries of France which this little pest has effected. That such a visitation, falling on the agricultural labourers of France, has been borne so bravely by them, is a clinching proof of the success of the system of peasant proprietorship which there prevails, and which has converted every rustic, even the very poorest, into a capitalist with a sufficient reserve to battle against such a calamity.

THE TEETH OF THE COMING MAN.—In the "Popular Science Monthly" (Appleton & Co., New York) is an article in which the writer, Oscar Schmidt, discusses this subject. He states, in the first place, that our present jaws display a reduced dentition; that the ancestors of man possessed a fuller number of teeth than we have; that in the course of our "geologico-zoological development" we have lost on either side, above and below, two incisors, two premolars, and one molar. This loss of teeth has come about simultaneously with the shortening of the jaws, which, as we all know, protrude so remarkably in the anthropoid apes. The writer agrees with the prediction of Cope, who describes the progressive dentition of the man of the future as follows:—

Man of the present, and lower races of the future.

Incisors, $\frac{2}{2}$; canines, $\frac{1}{1}$; premolars, $\frac{2}{2}$; molars, $\frac{3}{3}$.

The next stage of progress is to reduce us (that is the higher races descended from the readers of Hardwicke's SCIENCE-GOSSIP) to—

Incisors, $\frac{\mathbf{1}}{2}$; canines, $\frac{1}{1}$; premolars, $\frac{2}{2}$; molars, $\frac{3}{3}$.

A stage further will bring our successors to—

Incisors, $\frac{\mathbf{1}}{\mathbf{1}}$; canines, $\frac{1}{1}$; premolars, $\frac{2}{2}$; molars, $\frac{\mathbf{2}}{\mathbf{2}}$.

(*The thick figures indicate larger teeth.*)

Mr. Schmidt assumes that, as we advance intellectually and morally, we shall devote less and less of our energies to the business performed by the teeth, and thus continue the deterioration which commenced with the invention of cookery.

In the Phrenological Museum of Edinburgh there is a large collection of the skulls of savage tribes, of ancient Britons, and other ancient people. They are remarkable for the perfect preservation of the teeth, the absence of decay. Some of the skulls of ancient Britons are of old men, with the teeth ground down till their crowns are quite smooth and level, and must have stood but very little above the gums: none are absent, and all are packed close together. There is no doubt that we are going on worse and worse, and that the business of the dentist is progressively developing. It may be that this is the period of transition: that when we reach the climax of losing all our teeth on reaching manhood and womanhood, and take to artificial teeth as a matter of course, like boots and shoes, the consequent contraction of the jaw will be transmitted to our offspring, and with it the final reduction of dentition and ultimate extinction of the profession of dental surgery, owing to the sound growth and firm fitting of the fewer teeth in the smaller jaw.

SEEING THE INVISIBLE.—I may add to what I stated on this subject in the March number, that stars as faint as the 15th and 16th magnitude have been photographed, and that photographic maps of the heavens are in the course of preparation which will quite supersede the old catalogues of stars hitherto so laboriously produced by eye-observation and position-measurement. To determine accurately the movements that are taking place among the so-called "fixed stars," such photographic maps will be taken at different periods and compared. In some that have been already taken in the Milky Way, from 1080 to 2160 to the square degree are distinctly shown, with an exposure of one hour. Besides this the principle of photographic enlargement has been applied to the primary images of Saturn, and will doubtless be further applied to the other planets. Whether this will bring out further details of the surface of the planets, and whether more may be learned of the details of lunar landscape remains to be seen. One thing is already established, viz. that those who have not the privilege of using powerful telescopes will have that of examining at their leisure

nature-printed pictures of all that such telescopes can reveal; and those who agree with me in the conviction, that the diffusion of scientific knowledge and scientific taste is of even more importance than mere scientific discovery (discoveries communicated only to a few are but little better than vaporous material for the inflation of pedants), will welcome very heartily this great step in celestial photography. The vexed question of whether any volcanic action capable of producing visible changes on the surface of the moon is still proceeding will probably be settled, or at any rate be more approximately answered than by the method of comparing the drawings of one observer with those of another of different date.

THE PHOTOGRAPHIC PICTURES BY CHARLES BREESE.—Instantaneous photography, which is generally supposed to be a very recent invention, was successfully achieved by the late Charles Breese quite thirty years ago. He kept his process secret, and the secret died with him. I purchased all that remained of his stereograms after his death, and still have many duplicates. They remain unrivalled, especially the sea-pieces, where breaking waves and fine atmospheric effects are displayed. A picture of the moon about an eighth of an inch in diameter was the subject of much discussion at the time of its publication. Learned members of the Photographic Society proved, mathematically of course, that the actinic energy of the lunar rays could not possibly produce such a picture, which, taken thus by a common camera in fixed position, must be instantaneous, seeing that otherwise the change of position due to the earth's rotation would produce an elongated instead of a circular figure. It was therefore described as a "painted moon." To refute this calumny I threw the image on a screen by means of a lime-light lantern, which displayed details that could not have been painted as asserted; but I soon found a limit to this method of magnifying; the collodion film displayed a picture of its own special details more prominently than those of the lunar landscape—a network of cracks otherwise invisible. I have not yet learned whether the modern gelatine film is similarly defective. The possibilities of carrying forward the work described above will largely depend upon this.

MRS. OGILVIE, of Sizewell House, Suffolk, has just presented the Ipswich Museum with a cheque for 1300*l*. to defray the debt on the new buildings, in token of her admiration of the good work being done by Dr. J. E. Taylor, the Curator, in the elevation and education of the people by means of his popular lectures.

M. FAYE, the French geologist, thinks that the earth's crust must be thicker and denser under oceans than beneath continents, because the earth's heat has always radiated more freely there.

CHAPTERS ON ANIMAL PARASITES.

By W. A. HYSLOP.

No. I.

THE subject of animal parasites is looked upon by many as one of loathing, and not to be talked of or discussed in polite society; and this arises more from want of knowledge than anything else, as there is as little reason to avoid the mention of the word "parasite" as of any other word in science. The study of parasites opens the mind in a large degree, and the more intimate one's knowledge the less does he loathe, and the more does he admire, the wonderful provision made for these beings in the domain of Nature. That all parasites are hurtful is one of the numerous popular errors on the subject. Some most certainly are injurious when in large numbers, but by far the larger number are not hurtful; and indeed some naturalists have, not without good reason, considered them beneficial, as they act the part of scavengers, removing the epidermis, etc., from their hosts.

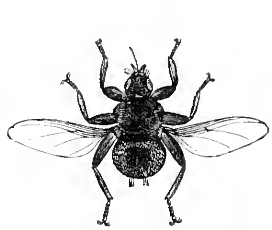


Fig. 72.—Ornithymia of Pigeon (slightly mag.).

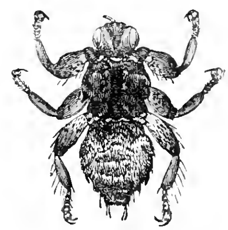


Fig. 73.—Lipoptena of Stag (slightly mag.).

The word "parasite" means literally eating beside, or at the table of another, and parasites have been loosely defined as "those whose living depends on other living creatures." This definition is rather wide, and might with advantage be limited to "those whose living depends on, and whose habitat is, other living creatures." If this definition be adopted, you throw out of the category of parasites all such insects as mosquitoes and midges, which only attach themselves to human beings and animals momentarily, and then fly off, and do not have, like true parasites, their abode on their hosts. Professor van Beneden has divided parasites into three divisions: the first he terms Commensaux, or Messmates, and includes those which for their living do not depend on their hosts, but merely profit by remaining at their tables; secondly, Mutualists, which live exclusively on the natural excretions of animals; and, lastly, Parasites proper: that is, those which for their livelihood require the blood of their hosts. M. Megnin, again, divides the subject into two main divisions, viz. those which are hurtful, and those which are not. For our present purpose it will probably be more simple, without entering into a discussion as to what place in the animal kingdom the Anoplura, or lice, and

Aphaniptera, or fleas, should be placed, to consider first those more highly organised parasites supplied with wings, etc., and work down the scale till we reach the genus Demodex or Hypopus, among the Acari, whose structure is extremely simple. The subject of vegetable parasites, generally of a fungoid type, such as that occasioning ring-worm, I do not propose touching upon, nor yet that large and interesting subject of Helminthology, so ably treated of by the late Dr. Cobbold.

Putting aside, then, such insects as mosquitoes, horse-flies, etc.—some of which suck the blood of their host, but do not make their dwelling there, while others lay their eggs beneath their skins, and whose larvæ are nourished there, and which consequently are, for at least a part of their lives, true parasites—we find, as perhaps one of the most highly organised, or at all events very nearly allied to the Diptera, the genus Ornithymia (Fig. 72). This genus contains several species, all of which are of large size, being but little smaller than the common bluebottle fly, and equipped with a pair of well-developed wings, though they, probably from disuse, do not seem of much service for flying, the species of the genus only being able to take short flights, which are little more than leaps. Their mouths are formed for suction, and from their large size these parasites must be injurious. The grouse, owl, plover, and several other birds, are the hosts of this genus. Next we may mention the *Stenopteryx hirundinis*, an insect about the same size, and very like the last, except that the wings are merely rudimentary. It is found about the nests and upon the young of the swallow. Passing still further down the scale we come to the *Melophagus ovinus*, or sheep-tick, called in Scotland the kade, and which is too well known to require description, beyond the fact that it is not a tick at all, and is entirely distinct from the proper sheep-tick, which is a species of Ixodes. Closely allied to this is the genus Lipoptena, found upon the stag (see Fig. 73). In both these genera the wings have entirely disappeared. We may here mention that curious and beautiful genus, the Nycteribiidæ, which is only found on bats. Those who wish to study this genus will find an able article in the "Transactions of the Zoological Society," vol. i. p. 274. Fig. 74 shows the peculiarities of this parasite

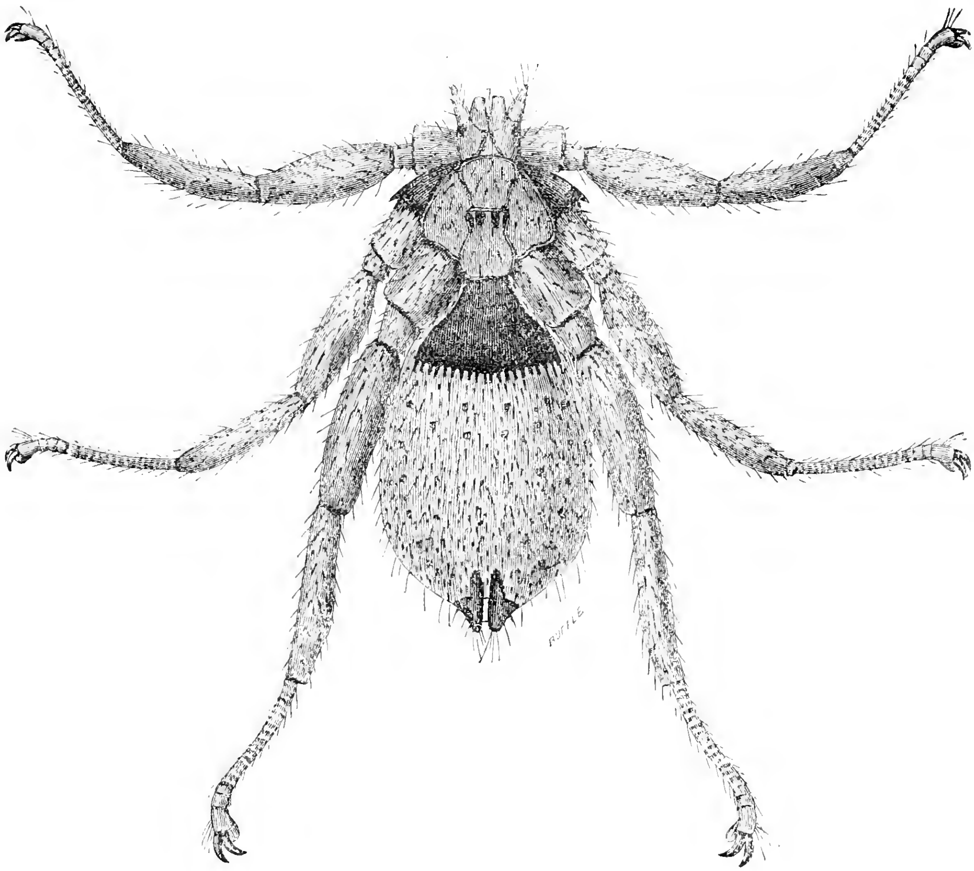


Fig. 74.—Parasite of Flying Fox, ♀. × 20.

better than any amount of written description, the long thin legs and the combs on the thorax being perhaps the most striking features.

At this stage of the descending scale may be noticed (though not strictly an animal parasite) the genus Braulidæ, which infests some kinds of bees. The peculiarity of the genus is that the last joint (or tarsus) of the leg is in the form of a comb with long teeth. They are of large size compared to their hosts. All the above parasites are classified by some writers under the name Pupipara, as in all the eggs are hatched, and the larvæ retained and nourished, within the body of the mother, until they have arrived at maturity, when they are extruded, and immediately pass into the pupa state. Only a single larva is developed at a time.

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

In the early part of April Fabry's comet became visible to the naked eye. At the end of April the comet approached the earth within about one-fifth part of the distance of the sun, and its brightness was theoretically nearly five hundred times greater than when it was discovered on the 1st of December.

Barnard's comet is also increasing in apparent brightness, though not so rapidly as Fabry's. It will be in perihelion in May, and will be at its closest distance from the earth about the end of that month. In the early part of May it will be more than a hundred times brighter than when it was discovered on the 4th of December, and will then be about half-way between the stars β and γ Andromedæ.

Professor Krüger has published ("Astronomische Nachrichten," No. 2718) a calculation of the elements for the approaching return of the orbit of the small comet which was first discovered by M. Tempel in 1869, but was not recognised as being periodic until its return in 1880, when it was rediscovered by Professor Swift. Its period is about five and a-half years, and it must have returned in 1875 without being seen. On the present occasion, owing to its position and distance, it will probably again pass without recognition.

Professor O. Struve saw the nebula near the star Maia, in the Pleiades, on the 5th of February, with the 30-inch telescope at Pulkowa. On the 23rd of February he made a careful drawing of the nebula, and on the following night he saw it with the 15-inch refractor. There are several small stars round it, from the twelfth to the fourteenth magnitude, one of these being variable, for its magnitude was measured on the 5th of February, and again on the 24th of February, when it had decreased to a magnitude and a-half less; and on the 24th it was not visible with the 15-inch telescope.

Venus is a morning star; at the greatest distance from the sun on the 29th of May. Saturn is an evening star towards the end of the month.

There will be no occultations of any stars above the fourth magnitude this month.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
Mercury ☿	7	3 51M	10 20M	4 49A
	14	3 39M	10 22M	5 5A
	21	3 26M	10 32M	5 38A
	28	3 20M	10 51M	6 22A
Venus ♀	7	3 4M	9 4M	3 4A
	14	2 51M	9 4M	3 17A
	21	2 38M	9 4M	3 30A
	28	2 26M	9 5M	3 44A
Mars ♂	7	0 44A	7 40A	2 40M
	14	0 28A	7 19A	2 13M
	21	0 14A	6 59A	1 47M
	28	0 1A	6 41A	1 23M
Jupiter ♃	7	2 30A	8 47A	3 8M
	14	2 1A	8 18A	2 39M
	21	1 33A	7 50A	2 11M
	28	1 5A	7 23A	1 45M
Saturn ♄	7	7 8M	3 21A	11 34A
	14	6 43M	2 56A	11 9A
	21	6 19M	2 32A	10 45A
	28	5 56M	2 8A	10 20A

Meteorology.—The mean temperature of the week ending March 20th was 3·4 below the average for 20 years. Rain fell on two days of the week to the extent of 0·16 of an inch—about 17 tons to the acre. The mean temperature of the week ending March 27th was 51 degrees, while in the preceding week it was only 38 degrees; it was greatly above the average on each day of the week. The mean temperature of the week ending April 4th was 47, and was 2·6 degrees above the average. Rain fell on six days of the week to the aggregate amount of 0·57 of an inch—nearly 60 tons to the acre.

The average mean temperature of London in May is between 53 and 54 degrees. The average rainfall of London is between one and two inches. On the south-east coast it is two inches, and on the south-west coast, near Plymouth, it reaches three inches.

ON MARINE COLLECTING WITH THE SURFACE-NET.

By Dr. G. W. M. Giles.

[*Continued from p.* 80.]

It will be found a useful practice to make a number of rough, free-hand sketches of the different parts of the animal as they come into advantageous points of view, as they prove of great assistance in the subsequent business of making an exact drawing from the dead subject. Not infrequently our little

friends are a deal too active for our purpose, rushing about the live cell in a manner that precludes all continuous observation. Under these circumstances an excellent dodge is to add, with a pipette, a very minute quantity of alcohol to the water in the cell. After a few vigorous kicks the creature becomes stupefied, and only moves in the sluggish manner best suited for our purpose. The effect of the dose, however, soon wears off, and a little more will usually require to be added from time to time, whenever the movements become undesirably extensive.

In such transparent creatures the process of death is most curious and instructive to witness, more especially in small crustaceans, such as Leucifer, Saphirina, immature Squillæ, etc.

Almost as soon as the last movements cease, the nervous centres commence to become granular, rapidly followed by the connecting commissures and peripheral nerves. This takes place some time before the other structures at all lose their transparency; and it is often possible to make a camera lucida drawing of the entire nervous system, in all its ramifications, before the supervention of muscular opacity obliterates the picture. No dissection could possibly rival the exactness of the results obtainable in this way, were even the animals of sufficient size to make such a process practicable. Next after the nerve elements, the muscles become opaque; and during the process much may be learnt as to the anatomy of the limbs as well, in flat things like Saphirina, of the body muscles, during the process.

Finally, the fluids of the general body cavity coagulate, their cellular elements become opaque, and the process of tissue death is complete. It is difficult to give any adequate idea of the wonders that may be followed in the living and dying animal. No object, e.g., could be better suited for the study of living muscular fibre than the limbs of some of these minute crustaceans, which are often thin enough to admit of examination with powers as light as 1–12.

I have occasionally succeeded in, to some extent, preserving this dissected appearance of the nervous system, by staining with borax carmine, and subsequent treatment with dilute acid in the usual way. The specimens in which this occurred were placed in the stain in the living state, or nearly so; and, as the result was by no means uniformly obtainable, I am inclined to believe that the secret of success lies in completing the process before the muscle fluids have had time to coagulate thoroughly. This, however, is but speculation, and further experiments are required to establish the conditions essential to success.

If it is desired to keep any single specimen under observation alive for any length of time, it is absolutely necessary to keep the water of the live cell thoroughly aerated; and a little apparatus for the purpose can be very easily and cheaply constructed as below.

Procure a couple of tin bottles, such as are used by workmen for carrying their tea to work with them. Have soldered into the side of each, close to the bottom, a piece of small brass tubing, about an inch in length. It is essential that the necks of the tins should be of the same size, so that the same cork may fit both. Into this cork fit a short piece of glass tubing, bent twice at right angles. A small brass tap, such as is supplied with injecting syringes, is connected with this tube by means of a short length of indiarubber piping, and about a yard of narrow rubber tubing is fitted on to the nozzle of the tap; the other end being slipped on to a piece of small glass tube, about three inches long, having its end drawn out to a fine point, and bent at right angles about half an inch from it. The brass pipes at the bottom of the tins are now connected by about one yard and a-half of rubber tubing, and the apparatus is ready for use.

To set it to work, insert the cork, with its tap closed, into one of the tins, and fill the other with water. Now raise the full tin to a couple of feet above the level of the other, place the fine point of the tube in the live cell, and gently turn on the tap. The point should be kept as far away as possible from the specimen, as, if too near, the stream of bubbles will give it a vibratory motion fatal to observation. The tap should be so turned that the stream of air may be very gentle, just allowing one small bubble to follow the next. Under these circumstances the stream of air will last fifteen or twenty minutes. When the upper tin has become empty, all that is necessary is to shift the cork into it, and reverse the places of the tins. Fig. 54 shows the tube arranged in the live cell, and Fig. 55 the general arrangement of the apparatus.

(*To be continued.*)

CARNELIAN ARROW-POINTS FROM ARABIA.

I HAVE lately obtained what I believe to be some specimens of great interest to the student of prehistoric archæology, namely some small arrow-points of carnelian and jasper from Arabia. These objects were loosely strung in the form of a rude necklet, for which purpose they were bored through their smallest diameter, and near the broad part of the arrow-point.

At first sight I was of the opinion, that they were crudely fashioned in this shape as a mere fancy by the persons who had bored and strung them; but I observed that the boring was sharp and rough, rendering the surface of the boring opaque.

The outline, however, of the arrow-tips themselves was not so, but, on the contrary, was highly polished and decidedly sub-angular, notwithstanding that the flaking and trimming were distinctly traceable. In

fact they presented a similar appearance in this respect to the implements from our drift and river gravels; and I therefore consider them to have been obtained from similar deposits in Arabia, or perhaps, instead of being water-worn, they are sand-worn; for I believe the general effect on siliceous material is pretty much the same.

Some are of a dark opaque jasper, others are of a brilliant red carnelian; others, again, are striped, or of a dull white. In form they somewhat vary, though I believe this to be due simply to the amount of wearing undergone, for whilst some are long, pointed, and well formed, others are short and truncated, whilst others again show but little of their original shape.

They are small, though not smaller than many arrow-heads I have seen from many parts of Europe. I should consider they were originally about an inch in length, and about half an inch in their greatest width. The shoulder is at right-angles to the shank, and not curved into a barb, as in the Irish type.

Upon inquiries as to how these objects became bored and strung as beads, I found that the natives regarded them with some awe, and wore them as charms; and this is no doubt so, for we find that arrow-heads and celts have been so regarded in almost all times, and by almost all peoples, however civilized. Even in this country and in the present day, I have found basalt polished celts kept by cottagers as an antidote for many an ill that flesh is heir to, and known to them as "thunderbolts." In some parts, too, arrow-heads or "elf arrows" are superstitiously regarded; and we read that the old Etruscans actually mounted arrow-heads in gold and wore them as charms.

I consider, therefore, that these beautiful carnelian arrow-points belong to a pre-historic period, and that they are found in old gravels, or perhaps in the desert sands, by the Arabs of to-day, who, naturally regarding them with superstition, bore them and wear them as charms.

EDWARD LOVETT.

Croydon.

OUR SCIENTIFIC DIRECTORY.

[It is our desire to bring out a Scientific Directory in the monthly pages of SCIENCE-GOSSIP, feeling certain that it would be very useful for our readers to know what scientific societies had been formed in their own neighbourhoods. We shall therefore feel very much obliged if Secretaries of any kind of Scientific Society, in any town or part of the country, will send us the full name and title of each Society, together with the names of the President and Hon. Secretary.]

BELFAST Naturalists' Field Club. Hon. Secretaries, W. Swanston, F.G.S., King Street, Belfast; F. W. Lockwood, Royal Avenue, Belfast. Meets at the Museum, College Square, Belfast.

Dumfriesshire and Galloway Natural History and Antiquarian Society. President, Dr. T. B. Grierson. Hon. Secretary, J. Wilson, 3, Norfolk Terrace, Dumfries. Meetings: first Friday in the month during the winter, and excursions on the first Saturday in the month during summer.

Elland-cum-Greetland Naturalist Society. President, Rev. A. Buckley, Langdale Street, Elland; Secretary, Oliver Sutcliffe, Elm Street, Stamland, near Halifax. Meets at Mechanics' Institute, West Vale.

Folkestone Natural History Society. President, C. E. FitzGerald, Esq., M.D.; Hon. Secretary, H. Ullyett, B.Sc., F.R.G.S., Lyell House, Folkestone.

Fulham Naturalists' Society. President, G. W. Thomas, Esq.; Hon. Secretary, P. F. Skinner. Communications to be addressed to the society's rooms, 1 Trewern Villas, Fulham Road, Fulham.

Glasgow Youths' Christian Association Natural History Society meets at 272 George Street. Hon. President, Duncan M. West, Esq.; President, John M. Campbell, Esq., Kelvingrove Museum; Secretary and Treasurer, A. J. McRobbie, 23 Rosehall Street, Glasgow.

North Staffordshire Naturalists' Field Club and Archæological Society. President for 1886-7, J. T. Arlidge, M.D.; Hon. Secretary, Rev. T. W. Daltry, F.L.S., Madeley Vicarage, Newcastle, Staffordshire; Hon. Treasurer, W. D. Spanton, F.R.C.S.E. Sections: *Archæology*, C. Lynam, F.R.I.B.A.; *Botany*, J. Blaikie, F.G.S, F.L.S.; *Entomology*, Rev. T. W. Daltry, F.L.S.; *Geology*, J. Ward, F.G.S.; *Microscopy*, T. S. Wilkins; *Zoology*, J. R. B. Masefield, M.A.

SCIENCE-GOSSIP.

BOTANISTS will be pleased to learn that the "Flora of the West Riding of Yorkshire," which Dr. F. Arnold Lees has been engaged on for some years, will shortly be ready for the press. It will be a complete and comprehensive enumeration of species in all the groups, phanerogamic and cryptogamic, together with chapters on lithology, climatology, bibliography, etc. The account of each plant will include its range, horizontal and vertical, and its history as a West Riding species. It is to be issued by subscription under the auspices of the Yorkshire Naturalists' Union, and will constitute an important volume of their series of memoirs dealing with the flora and fauna of Yorkshire. Further information may be obtained from the secretaries of the Union, Messrs. W. Denison Roebuck, F.L.S., Sunny Bank, Leeds, and W. Eagle Clarke, F.L.S., the Museum, Leeds.

UNDER the title of "Our Island-Continent: a Naturalist's Holiday in Australia," Dr. J. E. Taylor's new book, giving a popular description of the geology,

fauna, and flora of Australia as studied by him during his recent visit, will be published by the Society for Promoting Christian Knowledge early in May.

THE COLONIAL EXHIBITION is to be opened on the 4th of May. Visitors will there see living fern-tree gullies, and many of the characteristic Australian birds and mammals.

MR. F. GALTON, who is at present in Italy, has been seeking to obtain from the Vatican manufactory of mosaics some permanent colour-types for anthropological purposes. Mr. Galton proposes to obtain a scale of durable colours, for registering the tints of skin and hair, by using the imperishable enamel employed for mosaic work.

WE are sorry to record the death, at the comparatively early age of forty-five, of Mr. C. G. Talmage, F.R.A.S., the well-known astronomer. A more courteous, gentle, and modest follower of science never lived.

IT is with extreme regret we have to chronicle the death of Dr. Spencer Cobbold, the celebrated helminthologist, author of numerous papers on intestinal and other parasites, and of the well-known "Manual of Helminthology." Dr. Cobbold died at the comparatively early age of fifty-seven, and worked up to the very last. He was also well known both as a botanist and geologist.

MR. F. E. BEDDARD has just described, before the Zoological Society, a new and large species of earthworm from New Caledonia.

PROFESSOR EDWARD SOLLY, F.R.S., formerly known by his popular book, "Rural Chemistry," has just died at the age of sixty-seven.

"THE BUTTERFLY" is the title of a new journal of entomology which has been recently started, price 2*d*, edited by the proprietor, Mr. G. H. Skuse.

WE have received No. 72 of Mr. William Wesley's welcome "Natural History and Scientific Book Circular."

FROM some experiments of Dr. Krauss, of Halle, it appears that fruits grow much more during the night than the day.

A NEW sweetening substance, called saccharine, has been discovered by Dr. Fahlberg. It is obtained from gas-tar, and is said to be a thousand times sweeter than cane-sugar.

PROFESSOR HELMHOLTZ has confirmed the statements of Mr. John Aitkin, that the formation of cloud in saturated air is induced solely by particles of dust.

M. FOL states he has found in sections of the spinal cord and brain of animals which have died from rabies, a micrococcus he believes is peculiar to the disease, and probably its cause.

MICROSCOPY.

MOUNTING IN BALSAM.—Can any of your readers tell me why, after mounting micro-objects in balsam, and leaving them in clips for a week or more, the balsam will not set; and upon clearing the superfluous balsam away the air insinuates itself under the edge of the cover, working its way towards the centre, and completely spoiling my objects?—*Alfred Pinnock.*

TIGER-BEETLE'S WING-CASE (*Cicindela campestris*).—I have been examining the wing-cases of the above-mentioned with a view of ascertaining its ultimate structure. I am led to think that the elytron is composed of three distinct membranes: first, a surface membrane consisting of hexagonal cells containing or covering (?) the pigment matter to which the wing-case owes its colouring; secondly, a membrane made up of larger cells, circular in shape, and seemingly double-lined, though this may be an appearance due to depression. Connections appear to exist between cell and cell, giving the membrane very much the form of plant epidermis with its stomata. Lastly, a membrane of fine texture and marked by numerous dots, the precise nature of which I have not as yet sufficiently examined. The first-mentioned membrane is clearly seen under a $\frac{1}{6}$-inch or $\frac{1}{4}$-inch, with deep eye-piece. It shows cells best at the junction of the yellow spots with the general green surface of elytron. All three can be discerned in a carefully made scraping at the end of specimen. An inch glass shows them with sufficient clearness.—*R. F. Mullins, Dumfries.*

PREPARATION OF EPIDERMIS.—Place the leaf in distilled water in a test-tube, and boil. Remove the epidermis, and place it in the following solution: Equal parts methyl. spirit, glycerine, water; mix. After an hour or two, mount in glycerine jelly.—*Charles F. W. T. Willliams, B.A., Bath.*

MOUNTING POLLEN, ETC.—As a rule mount pollen dry. If too opaque in that way, then use glycerine jelly. Mount sections of stems in glycerine jelly, first soaking in solution as advised in note for preparation of epidermis. As a rule, avoid damar or balsam in mounting botanical specimens. For a complete guide to section cutting and mounting see "The Microscope in Botany," pp. 165–203.—*Charles F. W. T. Williams, B.A., Bath.*

HUNTING FOR AMŒBAS.—Many students beginning to use the microscope in the investigation of living minute animals have heard so much of the Amœba that they are surprised they do not find it at once. The fact is, Amœbas, although common, require to be looked for. Their transparent and colourless structure screens them, and even trained workers are by no means certain to find Amœbas when they require them. I have found the following simple device for

catching them to be successful in the highest degree. I lower one of the ordinary shilling glass troughs down to the bottom of my fresh-water aquarium—indeed, I generally have one lying there for use at any time. When the trough has been immersed about twenty-four hours, on being carefully brought up, numerous Amœbas will be found crawling on the inner surfaces of the glass.—*J. E. Taylor.*

A New Glass for Objectives.—In 1878, Professor Abbe, son-in-law of Dr. Carl Zeiss, of Jena, pointed out that we could not hope for any considerable improvements in objectives until some better material than crown or flint glass were obtained. Since then the German government appropriated twenty-five thousand marks to enable Zeiss to make experiments, with a view of obtaining a glass more suitable for lenses, and the result has surpassed all expectations. Dr. H. van Heurck, of Antwerp, speaks of a new homogeneous immersion $\frac{1}{8}$, with numerical aperture of 1·4, manufactured from the new glass, as follows: "The images are of wonderful clearness, and the objective has greater resolving power than any that we have hitherto had. With vertical illuminator *Amphipleura argenteum* is resolved into pearls over the whole surface with such sharpness that they may be counted. No doubt the objective will show us, in many diatoms, details which have hitherto escaped observers. Bacteria will probably exhibit details of structure as yet unknown, and which will perhaps enable us to better differentiate the species." Others speak equally highly of this objective.

ZOOLOGY.

A Problem in Geographical Distribution.—A study of the geographical distribution of the British Mollusca has brought me face to face with the conclusion, that they are derived from three sources—northern, eastern, and western. It would seem that since the Glacial epoch the following great changes in the distribution of land and water have taken place: first, that most anciently there was land stretching from the polar regions to Spain and Africa, and that, while Ireland and the south-western extremity of England were united to the Continent, the eastern and south-eastern portions were submerged, as also the valleys of the Seine and Loire. Later on, the connection between western Britain and the Continent was severed, and another was established across what is now the Straits of Dover. In support of these suggestions, which are by no means novel, there are many facts, such as the occurrence in the south of Ireland of Geomalacus, and many southern plants not known in England, but living also in Spain; and in the same district of northern species such as *Helix lamellata* and *Cordulia arctica*, which are similarly absent from south England, but are present in Scotland. The British species of inland mollusca may be readily divided into the three divisions proposed as follows:—

1. Northern: *Limax cinereo-niger*, *L. tenellus*, *Helix lamellata*, *H. pulchella*, *Pupa ringens*, *Vertigo Lilljeborgi*, *V. alpestris*, *Planorbis parvus*, *Limnæa palustris*, *Unio margaritifer*.

2. Eastern: *Testacella haliotidea*, *Hyalina glabra*, *Helix pomatia*, *H. cantiana*, *H. cartusiana*, *H. lapicida*, *Vertigo Moulinsiana*, *Clausilia Rolphii*, *C. biplicata*, *Cyclostoma elegans*, *Neritina fluviatilis*, *Paludina vivipara*, *Hydrobia similis*, *Planorbis lineatus*, *Limnæa glutinosa*.

3. Western: *Geomalacus maculosus*, *Limax arborum*, *Amalia gagates*, *Testacella Maugei*, *Succinea oblonga*, *Hyalina Draparnaldi*, *Helix aspersa*, *H. fusca*, *H. pisana*, *H. revelata*, *H. rupestris*, *H. obvoluta*, *Cochlicella acuta*, *Bulimus montanus*, *Pupa secale*, *Paludina contecta*, *Planorbis nitidus*.

I do not submit these results expecting them to be entirely accepted, but rather because I want to provoke the consideration and discussion of this important but somewhat neglected problem in the hands of working naturalists; and more particularly I want every one to examine his own district, and see whether it confirms or disproves the above theory. It seems in every way probable that the separation of Ireland from the Continent and from the south of England preceded the separation of the latter district from Western France.—*T. D. A. Cockerell.*

Arion subfuscus.—I think there is a slight misapprehension as regards the supposed *A. hortensis*, var. *subfusca*. I have not seen Mr. Wotton's Cardiff examples of this form, but imagine that they are probably identical with the species described provisionally under that name in Science-Gossip for October 1885. I am now satisfied that this form is the *Arion subfuscus* of Draparnaud, who gives a good figure, as well as a description, of the species. It may be known from *A. hortensis* by its larger size when adult, and its orange-brown colour, and from *A. ater* by its lateral bands and smaller size. It is probably well distributed in England from Northumberland (Sutton) to Truro in Cornwall, from which locality I have received several specimens from Mr. J. H. James, found in his garden in company with *A. hortensis*, *Amalia gagates*, vars. *plumbea* and *rava*, *A. marginata*, *Limax maximus*, vars. *quadrifasciata* and *Johnstoni*, and *Limax agrestis*, var. *sylvatica*. With regard to the last, it will be well to state that in this and other former communications, the *sylvatica* intended is that of Moquin-Tandon, *not* that of Draparnaud. The original description of Westerlund's *A. ater*, var. *cinerea*, is as follows: "Abdomine fasciis tribus atris, lateribus pallidis sesquipollicariis." This scarcely agrees with Mr. Williams's translation.—*T. D. A. Cockerell.*

A Group of Rotifera.—In connection with this article in April Science-Gossip, a transposition of two of the figures took place at the last moment. 58*a* should be 59*a*, and 59*a* should be 58*a*. A careful perusal of the text will show this.

Albinism.—The following newspaper (Feb. 2, 1886) clipping will, I think, be interesting to those who, from time to time, have corresponded in Science-Gossip, on the subject of albinoes. "In Germany an unusual number of white varieties of animals are noticed this winter. A white chamois was shot in the Totengebirge, a white fish otter was caught near Brunswick, and a white fox was killed in Hessen." The present winter has been distinguished for falls of snow heavier than have been experienced for a considerable number of years, and in this paragraph we are told of an unusual number of animals clothed to meet it in suitable winter coats of white.—*H. W. Lett, M.A.*

GEOLOGY, &c.

The Pliocene Beds of Cornwall.—A paper on this important discovery has just been read at the Geological Society by Messrs. Robert Bell and Kendal. It consisted of a description of the beds exposed at St. Erth, a list of the molluscan fossils identified, and is a continuation of that by the late Mr. S. V. Wood, read to the Society in November 1884. The only important fossiliferous bed is a blue clay, and fossils have only been obtained in one spot, though the beds have been traced over an area of about 120 acres. The fossils are well preserved, and, with a few unimportant exceptions, are of invertebrate forms. The authors considered that the fossils agree in age with the middle or lower portion of the Red Crag, but that whilst many species having a southern character are present at St. Erth, and wanting in the Crags of the east coast, the Boreal and Arctic forms found so abundantly in the Crag are absent at St. Erth. In explanation of this remarkable fact, it was suggested that when the St. Erth beds were deposited, although the North-Sea area was in direct communication with the Arctic Ocean, the western part of the British Channel was not, that the British Isles were joined to the continent of Europe on one side and to Greenland on the other, the Shetland and Faroe Islands and Iceland being the remnants of the barrier that formerly divided the Atlantic from the Arctic Sea. Evidence is given in support of this view from the present submarine configuration of the North Atlantic. It was also shown to be probable that the St. Erth area in Pliocene times was more directly connected with the Mediterranean than at present, by a marine channel that traversed France.

The Anniversary of the Geological Society.—On the above occasion the Wollaston Gold Medal was presented to Professor Descloiseaux; the Wollaston Donation Fund to Mr. Starkey Gardner, for his researches in fossil botany; the Murchison Medal to Mr. William Whittaker, B.A., F.G.S., for his contributions to geological science and literature; the Murchison Geological Fund to Mr. Clement Reid, for his researches in East Anglian geology; the Lyell Medal to Mr. William Pengelly, F.R.S., for his cavern and other researches; the Lyell Donation Fund to Mr. D. Macintosh, for his labours in glacial geology; and to Dr. H. J. Johnston Levis the Barlow-Jamieson Fund, for his studies in Vesuvian volcanic products, and the Ischian earthquake.

"British Petrography."—Part 3 of this original and splendid work has just appeared. Mr. Teall deals with the chemical characters of igneous rocks, and the two beautifully coloured plates show sections of picrite, scyelite, hornblende-picrite, etc., with key-plates to each.

NOTES AND QUERIES.

Instinct in Parrots.—Dr. Kegan, for one, will not admit that the lower animals have any right to what we call "reason." When a child he has probably been taught by the womenkind (as most of us are) that men have reason and animals instinct only, and this theory having become thoroughly ingrained in him, I am afraid no amount of facts would ever convince him to the contrary—no, even if Balaam's ass were to talk to him, he would still call it instinct. It is all very well to assume that had the cage been open the parrot might have pitched the encumbrance outside altogether, and run the risk of starvation, but the contrary might also have been the case; he won't allow any poor animal a modicum of sense; it is always "an association of ideas" with him, as if we human beings were not subject to the same complaint. We don't expect animals to be "marvellously clever," but many of us do claim for them a certain amount of intelligence, and I, for one, could give several instances thereof, but, so far as our friend is concerned, I am afraid I should only have my trouble for nothing.—*H. M.*

A Clever Bird.—It may interest the bird-loving readers of Science-Gossip to know that a Norwich canary in my possession has acquired the songs—perfect in every detail—of the following birds: African green singing finch, siskin, and chaffinch, also the final notes of the song of the Virginian nightingale. All these birds I kept a short time since in an aviary with the canary. It is a strange thing, too, that the canary has only sung these songs since the departure of the other birds. He commenced to sing them about two weeks after I had sold the small birds mentioned; whilst the Virginian nightingale had been dead six months or more, thus showing a very retentive memory. No one scarcely would credit it unless they heard him. He reproduces the songs of the birds above mentioned in the minutest detail; and one could readily believe that my old friends were still the occupants

of the aviary. Not only does he (the canary) reproduce the songs, but also the *call-notes;* which are interspersed with snatches of his own song. Thus he mostly begins with the African green-finch's song, gradually merging into his own liquid notes; then comes the "pink, pink, pink," of the chaffinch, followed by the song of the same; then the song and harsh call-notes of the siskin are introduced, all one after the other in quick succession, and invariably ending with the final notes of the Virginian nightingale's song. I was very nearly disposing of him to the lady who bought my other birds; but I need scarcely say how pleased I am now that she declined to have him. He is really the most wonderful mimic I ever heard, and those who have heard him too say the same—not of very prepossessing appearance, it is true, but nevertheless a wonderful little fellow; bold and fearless, too, in a remarkable degree, and a great pet. When I clean the aviary, he will alight on the back of the knife with which I scrape the perches and branches; he will also jump on to the seed-tin before I can fix it in its place, and chirps out at me in quite an impudent manner. Indeed, from his general air of superintendence, we call him the "Foreman."—*William Finch, jun., Nottingham.*

THE WHINCHAT.—The following record may be of interest. It is from Mr. W. P. Ellis, of Enfield Chase. I give his own words: "The whinchat, a little bird very plentiful with us during the breeding season, occupies a piece of ground not more than one mile square. I dare say on it a hundred pairs breed annually. These birds seem very successful in rearing their young ones, and it is not infrequent that they bring up a whole batch from six or seven eggs. About the commencement of September all the chats in the neighbourhood congregate into one portion of the district, and all of a sudden, and apparently at night, they depart, but leaving behind them about two pairs of birds. These two pairs remain quite contented during the whole of the winter until about April 3rd, when I have repeatedly missed them, and we see no more winchats until about April 20th, when they return in the usual abundance to nest with us." He then remarks: "Now what seems strange to me is that these two pairs of birds are *always* (for I have noticed the fact for several years) left behind, and the main body migrate. It cannot be the approaching severe weather, for surely if some can bear it the others can." This is what is the more interesting; and, as migration as yet is veiled in obscurity, we can only conjecture, if that be any good. I wonder if these two pairs of birds are left behind as sentinels, and whether, as spring arrives, they leave to join their fellows in the movement inwards, and to acquaint them of their old nesting-place, if favourable to their return or otherwise. You see they absent themselves for a fortnight previous to the arrival of the main body.—*J. W. Williams, D.Sc.*

ANCIENT DEFINITIONS.—I possess an old book "The Compleat Housewife," by one E. Smith, published in 1742, in which are given directions for carving various birds and fish. Thus, for instance, a barbel is to be "tusked," and a crane is to be "displayed." But what is a "brew," which is to be "untached;" and what is a "cheven" which is to be "finned;" and 'Egript," which has to be "broken"? To give a few more as they stand in the list, as a curiosity for your readers: Chicken, to frush; coney, to unlace; crab, to tame; eel, to transon; hen, to spoil; peacock, to disfigure; pheasant, to allay; pike, to splat; quail, to wring; sturgeon, to tranch; trout, to culpon.—*Windsor Hambrough.*

AN EAGLE'S REVENGE.—The following anecdote illustrates the reasoning power of the golden eagle, *Aquila chrysætos*, Linn., and is worth preserving. My informant is my father, the Rev. Canon Charles Lett, B.A., T.C.D., who witnessed the occurrence in the year 1828, and he has often related it to me. A Mr. John Palmer, who resided at Kingston Terrace, in the city of Waterford, had a tame eagle which had been procured when young from the Comeragh Mountains, co. Waterford, Ireland, where these birds, till quite recently, yearly nested (see Thompson's "Natural History of Ireland," vol. i. p. 9.) This particular bird was not confined or restrained in any way, but had the run of the yard and garden, and was quite tame. The owner on one occasion, to amuse some of his friends who had called upon him, placed the house-cat close to the eagle, which attempted to seize it, but retreated in alarm on the cat spitting at it. A chicken was next brought, and instantly pounced upon. The owner, however, released it, whereupon the eagle hopped clumsily after it, and in vain tried to overtake it. When it perceived its failure, it turned towards Mr. Palmer, and, to his alarm, seized his legs in its talons, and began to attack him with its powerful beak, evidently in revenge for being deprived of its prey. As the incident took place in the garden, a cabbage stalk, like those of which walking sticks are made in Jersey, was quickly procured, and the angry and disappointed eagle beaten off.—*H. W. Lett, M.A.*

MIMULUS LUTEUS.—I have seen this plant growing freely on the banks of the Tay in Fifeshire, N.B. An Aberdeen friend of mine tells me he has frequently seen this plant growing in Aberdeenshire; in fact, it is, he says, a common one there.—*L. Barron.*

"MIMULUS LUTEUS" has been observed in the co. Wicklow for many years, and also in many other parts of Ireland: see "Cybele Hibernica."—*S. A. B., Glendun Lodge.*

POISONOUS EFFECTS OF THE YEW.—The following incidents may interest some of your readers, as illustrating the poisonous effects of the yew-tree on animals. My pet donkey was one day last summer led from the orchard to the lawn, which was bounded on one side by a fine old yew-tree leaning against the wall. Jenny was tethered by a long rope to a stake in the middle of the lawn just before the gardener went to his dinner, and we left her browsing on the grass when we adjourned to lunch. After luncheon I went up to the open window, when one of the children who were with me exclaimed: "Jenny is eating the yew." He ran at full speed and dragged the little bit of yew branch which Jenny was munching out of her mouth, but not before she had bitten off and swallowed some of it. I followed as soon as I had shut up my watch, which I happened to be setting at the moment. We at once led Jenny away from the yew, and shortened her rope. I then returned to the house, feeling glad that I had been (as I hoped) in time to prevent any ill effects, since there was no evidence of broken twigs or scattered leaves to show that she had been long at the yew-tree. I left one of the children with the donkey; but before I could reach the house I heard a lamentable cry, "The little donkey is ill;" and, turning back, I saw the poor beast in the act of falling on her side. We tried to raise her, and even fetched a bottle of ammonia to hold to her nostrils, as I had a vague recollection of having read of a cure from poison by

inhaling ammonia. As I watched the symptoms, I observed that once or twice her sides heaved, she made a spasmodic attempt to vomit, and then the limbs stiffened, the sides swelled up to a monstrous size, and poor Jenny breathed her last before our eyes. I looked at my watch as I returned to the house, and saw that just twenty minutes had elapsed since I set my watch at the window.—*L. A.*

Caterpillars of Papilio Helenus.—I have several caterpillars of *Papilio Helenus*, bright-green, beautifully marked, and wonderfully painted false eyes. They feed on the orange leaf, and, on being irritated, protrude a pair of pink, waxy, snail-like tentacles, which give out a strong and delicious scent of orange. On looking at these caterpillars one morning, I found one of them almost covered with little oval, white, woolly pupæ, which apparently must have come out of the body of the caterpillar during the night; and on another occasion I saw one of the caterpillars with only a little woolly substance about the middle of the body, but on examining it through a lens I saw little transparent, amber-coloured protuberances, which I laid hold of with a fine pair of pincers, and drew out one at a time, in all, thirteen larvæ of some ichneumon fly, somewhat similar to those I saw before, but not covered with any woolly substance. The question is, Did the first batch come out of the body of the caterpillar, or were they placed round to devour it afterwards? because the caterpillar I first took out of this woollen wrapper of apparently small chrysalises lived till it turned into a chrysalis, and afterwards changed into *Papilio Helenus*. Can you inform me if there is any work I can consult on caterpillars, more especially with reference to this scent-tentacle, which I believe only occurs in the Papilionidæ? I only find slight reference to this peculiar scent-organ in Packard's American work and Duncan's "Metamorphoses of Insects." Pouchet doesn't mention it, and our new book on Indian butterflies, by Marshall and De Nicéville, has not a word on the subject. However, I manage to keep them protruded; what is the best medium to mount them in for the microscope?—*G. C. E., Coonoor, Nilgiri Hills, Madras Presidency.*

Gallinula chloropus.—One of my pets is a tame moor-hen. She has lived for some months past in an aviary constructed specially for her, and in which is a miniature pond for her to bathe in. She thrives very well on boiled potatoes, meat cut into small morsels, bread, a little corn, and occasionally snails, slugs, and earth-worms. She seems quite indifferent to cold, and will go into her bath, after I have broken the ice for her, when the temperature is such that the water must almost freeze on her. Her evolutions in the water are very amusing to watch; she ducks her head repeatedly under the surface, and seems thoroughly to enjoy her bath. She much prefers to pick her barley out of the water to eating it dry, and likes it best when it is well soaked.—*Albert H. Waters.*

"A Remarkable Robin."—May I suggest that the supposed variety of the robin, described under the above title on p. 95, was a specimen of the snow bunting (*Plectrophanes nivalis*), flocks of which are not very infrequent during the cold weather in Britain, more particularly in the north?—*T. D. A. Cockerell.*

The British Slug List.—Referring to Dr. Williams's useful and interesting papers, now appearing in your columns, on the variation and continental distribution of our slugs, I notice the author states that the var. *albo-lateralis*, Roebuck, of *Arion ater*, "is only known from North Wales and Sussex." I am pleased to inform him that I met with this variety near Oswestry, Salop, in June last, and sent specimens to Mr. Roebuck as Recorder for the Conchological Society. About eight miles farther north, just within the borders of Salop, I also took a specimen of the somewhat rare mollusk, *Limax cinereo-niger*.—*B. Hudson.*

Electric Eel.—Perhaps the following will be of interest to Mr. C. L. Jackson, as he has "never seen in print before" the fact that electric eels exert their power through the water. I copy this from "Animal Physiology," by the late Dr. W. B. Carpenter, F.R.S. He says (p. 341, 1864 ed.): "This power is employed by the fish (gymnotus) to defend itself against its enemies, and even, it is said, to destroy its prey (which consists of other fishes) at some distance, the shock being conveyed by the water as a lightning-conductor conveys to the earth the effects of the electric discharge of the clouds." It is different in the case of the torpedo: this fish must be touched in two places before any shock is felt; if it is only touched in one place it will turn itself so as to make another part of its body touch the intruder, and so "complete the circle."—*A. W. Harrison.*

The Shard-borne Beetle.—"The shard-borne beetle, with its drowsy hum" (*Geotrupes vernalis*, fam. Scarabæidæ), has many names in common. It is also called the "watchman's clock," etc. Gray, in his "Elegy Writtenin a Country Churchyard," alludes to it.—*H. H. Westerfield.*

A Kitten resembling a Rabbit in its Hind-Quarters.—The following was narrated to me by a resident in Cushendun, who heard it from a farmer, John O'Hara, Crooknacraw. O'Hara's cat left the house for several weeks, and returned with kittens, the hinder part of one resembling a rabbit. It was killed, as it was considered unlucky. On looking over Loudon's "Magazine of Natural History," (vol. v. p. 275), there is a similar statement which occurred at Newark, at a farm called Meering, in 1831. That two animals of such opposite natures as the cat and rabbit should unite, and the produce partake in so distinct a manner of both species, is remarkable in a physiological point of view. This, I think, is worth inserting in Science-Gossip, when some of your readers may be able to furnish more light on the subject.—*Rev. S. A. Brenan, Glendun Lodge, Cushendun, co. Antrim.*

The Cuckoo.—A gentleman, who lived at Brymbo, North Wales, for some years, communicated to me a curious fact, which some of your readers may be interested in: namely, that the cuckoo lays her eggs in the nest of the ring-dove or wood-quest. I have never heard or seen an account of this before, except in the Rev. Gilbert White's "Natural History of Selborne," letter xxx., where he writes that "the excellent Mr. Willoughby mentions the nest of the palumbus ring-dove." My friend told me that he wanted to rear a young wood-pigeon, and climbed to one of the nests, and found two eggs, one totally different from the other, which greatly surprised him. When the young were hatched out, the parent birds ejected them from the nest, and so they perished. Differences in eggs were observed in other nests. Could there be another bird who lays eggs similarly to a cuckoo?—*Rev. S. A. Brenan, Glendun Lodge, Cushendun, co. Antrim.*

The Bee and Caterpillar.—A friend in co. Tyrone states that she saw at harvest time, in a field of oats, a wild bee carry off a caterpillar. Is this an uncommon occurrence?—*Rev. S. A. Brenan, Glendun Lodge, Cushendun, co. Antrim.*

Sagacity of a Collie Dog.—Among the numerous instances received of the sagacity of dogs under certain peculiar circumstances, when intelligence has been displayed equal to that of man, the following instance which has just occurred in Northumberland during the recent unexampled snowstorm in that county will, I think, bear a favourable comparison to any of them. On the morning of Saturday, the 6th of March, a collie dog belonging to Mr. Walter McDonald, farm steward, Ilverton, near Wooler, displayed a remarkable amount of sagacity, and rendered good service in probably saving his master's life. It appears that a dam which conveys water to the pond had been completely blocked by the storm of Monday and Tuesday previous; and Mr. McDonald, accompanied by his dog, had gone to the head of the dam, which is about a mile distant, to ascertain what strength would be required to clear this away for the free run of the water. In making his way along a piece of sloping ground he suddenly fell into a wreath of snow some nine or ten feet deep. While engaged to free himself, the faithful collie seized him by the arm; and, seeing his master trying in vain to reach the branch of a tree overhanging him, the dog instantly sprang at the branch and, seizing it, held it down to his master's grasp, who finally succeeded in obtaining a firm footing.—*Dipton Barn.*

Birds Singing at Night.—Just after the break-up of the late frost, and on a mild and moonlight night, as I was lying awake (time, 11.45 P.M.), a blackbird gave out its well-known, quick, consecutive notes, renewing them at intervals up to twelve o'clock, immediately after which hour a thrush began to sing most beautifully and joyously. Surely this is very unusual so early in the year? I can only conclude that, the east winds having so long kept him silent, he couldn't help himself, and thus serenaded his mate, who, I fancy, was not far off, on her nest, telling of "a good time coming," in the way of worms and snails, in the morning.—*Windsor Hambrough.*

The Violet.—I was surprised to notice the inaccuracies in Mr. Hampden G. Glasspoole's paper on "The Violet" in last May's number. I will deal *seriatim* with the mistakes. I never heard of Io (not Ia), a daughter of Atlas, being pursued by Apollo; probably Mr. Glasspoole must have been thinking of Daphne, who was—as we read in Ovid's "Metamorphoses" (book i. 452)—turned into a laurel-tree (not into a violet) to escape the love of Apollo. There may be a myth about the metamorphosis of a woman into a violet, but her name was certainly not Io. Again, the Greek Ἴον, "a violet," has nothing to do with Ἰώ, the proper name (there is no such woman as Ἰων (not Ἰον) in Grecian mythology. There is, however, a form Iōn in Latin, occurring only once, I believe—in the "Aulularia" of Plautus (3, 6, 20). The iota in Ἴον, "a violet," is short, while it is long in Ἰώ, the proper name. There is no work of Aristophanes known as "The Seasons"; as I do not at present possess an Aristophanes with an "Index Vocabulorum," I cannot discover the passage quoted by Mr. Glasspoole. The wine made by the Romans from violets was called "violatum vinum"; there is no such substantive in Latin as "violatum." "Rosatum," not "rosaltum," is the word for wine made from roses. I must accuse Mr. Glasspoole of plagiarism, as he has copied, word for word, the all but last paragraph of his paper from "The Treasury of Botany," pl. 1218—I mean the paragraph beginning, "Professor Buckman states," to "the troublesome little insect to be hatched." I hope Mr. Glasspoole will forgive me finding fault with his otherwise interesting account of the violet.—*C. Donovan, jun., Westview, Glandore, Leap, co. Cork.*

Garden Slugs.—On April 5th I found beneath some old stones in a garden two young *Arion ater*, (about the size of *Arion hortensis*), which were white. Whilst examining them along with some other slugs on a table, I happened to place the two white *Arion ater* on a green leaf, and in a few minutes they became of a greenish colour. Has any one else made any similar observations in regard to slugs? Along with the *Arion ater* I found two full-grown *Arion hortensis* with the foot a deep orange, and the entire body and mantle of a dull orange, with the usual black lateral bands. I also examined two *Limax agrestis*, var. *nigra*, which had been found in a garden at Wakefield by Mr. J. Wilcock.—*George Roberts, Lofthouse.*

Tail of Slow-Worm Sloughing off.—A slow-worm which I have kept since April 1884 has just died; on March 28th the tail scales were very rough, and appeared erect. April 2nd I found the tail had sloughed off, and the next day the animal died. I shall be glad if readers of Science-Gossip can throw any light on so singular a death. Perhaps I ought to mention that in the same case there is kept a frog which I reared from the spawn, and a toad.—*Geo. E. Turner, Winterborne Stickland, Blandford.*

Flight of Bees.—In answer to Mark Antony's third query at p. 94, I must say that the idea of a bee flying in circles to and from the hive, by which he must mean all the time it is on the wing, is quite new to me, and is, I think, incorrect. A bee, as soon as it first leaves the hive, circles round and round till it has well marked in its eye the spot it has just come out of, and then it flies straight away in search of flowers; and when it is on the return journey, laden with sweets and perhaps pollen, it also flies in what likewise has passed into a proverb as "a bee line." In late autumn and early spring, when bees get a chance of a mild day, they take a short flight to cleanse themselves of fœces, and this certainly is always in a circle. But let any one stand between a field of white clover in bloom and a hive of bees, and he will see how truly go-ahead is their journey on the wing.—*H. W. Lett, M.A.*

Bird Gossip.—The severe weather, with continued frost, which prevailed nearly all through the first three weeks of March, played sad havoc amongst our thrush tribe. Our fields and woods through these weeks were thickly populated by thrushes—particularly the song-thrush and redwing; the fieldfare and missel-thrush coming next in proportion. The blackbird seems to have been less numerous; even a pair in my garden were seldom seen. This tends to show that blackbirds as a rule went farther south, or that the main body of migrants were later than the other thrushes in returning, and did not get caught in the late spell of winter. Many deaths occurred during these few weeks, principally amongst the song-thrushes, the death-rate of the redwing and fieldfare ranking next, while a few missel-thrushes also succumbed—it may be equally according to numbers; but they are much less plentifully met with than the other thrushes. The deaths appear in all cases to

have been from starvation and consequent weakness, the dead birds picked up being little but skeleton, skin, and feathers. I knew of several fieldfares captured alive, in a weak state and unable to fly. With the change in weather, however, a total change of scene has followed. Fieldfare and redwing have gone north, missel-thrushes to the woods, while the blackbird and the song-thrush are now (March 28) building their nests, as is also the robin. Hedge-sparrows are courting, while the greenfinches and chaffinches, which usually build in the garden, are constantly before us in sight and hearing. Wrens are singing against each other as if for a wager; and a pair of red wagtails, which have nested for several years in an old stem, are carefully inspecting their old quarters. The mischievous house-sparrow, too, is quarrelling over nesting quarters, and pulling straws out of the thatch of the summer-house roof for some one else to clear up. Already two of our summer migrants have turned up. Several chiffchaffs were seen and heard on the 22nd of March, and a pair of sand-martins on the 25th.—*William Jeffery.*

Otters in the Eastern Counties.—I am not aware that the otter has been met with in Cambridgeshire in recent years, and most naturalists believe it to be extinct in the county, but one, if not two, have been lately captured not far from the borders of Cambridgeshire. A fine female was caught on February 23rd near Mildenhall, in Suffolk.—*Albert H. Waters, B.A., F.S.Sc.*

Lambs Killed by Otters.—In March, on the banks of the Dovey (Montgomery) a farmer lost seven or eight young lambs. Not being able to account for it, he watched, and saw an otter kill two. He then complained to one of the river-watchers that his otters were killing all his lambs. The keeper said it was nonsense, and impossible, and would not believe it, till the farmer told him he had seen the otter do it. Is this an uncommon occurrence?—*M. E. Thomson.*

Flowers of Azalea.—What is probably the reason why some of the flowers upon an azalea shrub should, year after year, be of a very much darker shade of colour than the majority, which are of a light pinkish shade? Those of the dark are in a mass together.—*A. P.*

Cleaning Echinus Spines.—Which is the best way of cleaning the spines of Spatangi without injuring them, so that they will show well for mounting?—*W. M. Ranson.*

Food of Weasels.—Jesse, in his "Scenes and Occupations of a Country Life," says that "keepers have informed him that weasels kill and feed ofttimes upon snakes." I should be glad were some one to personally confirm this.—*T. W. Williams, D.L.S.*

A curious instance of protective sagacity was shown in the prescience, as it would appear, of a pair of swans, who in July of 1884 had completed their nest on the bank of a dyke at Washingboro', near Lincoln, preparatory to the laying of eggs; but on the fourth day of the month were observed by some labourers to set to work afresh and raise their nest till the structure was piled up two feet higher, as though conscious of the great storm that was approaching. On Thursday, the 5th, rain fell in torrents (accompanied by thunder and lightning), the whole land was flooded, and their nest would inevitably have been swept away but for this precaution. The eggs were saved and the nest left high and dry after the subsidence of the waters.—*C. M. V.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

We request that all exchanges may be signed with name (or initials) and full address at the end.

G. W. C.—The Government of Ceylon have published a work on the Lepidoptera of that island by Mr. F. Moore, F.L.S., in two volumes, price £6 10*s.* Inquire of Messrs. Lovell Reeve & Co., Henrietta Street, Covent Garden, London.

W. F. C.—The photograph you sent us is evidently that of a mite which probably infested the dipterous insect.

West Kirby (Liverpool).—The minute shells are *Hydrobia ulvæ*, common nearly everywhere on the British coasts. See vol. iv. of Dr. J. Gwyn Jeffreys' "Manual of British Mollusca."

F. W.—We stated in error last month that the "Journal of Conchology" was published monthly; we ought to have said quarterly.

T. W. W.—The best text book on botany is by Professor Sachs, translated and edited by Professor Thistleton Dyer and Mr. A. W. Bennett, and published by the Clarendon Press, Oxford, price 28*s.*

C. L. S.—You had better apply for information concerning an exchange list of British land and freshwater shells of the editor of the "Journal of Conchology," Hunslet New Road, Leeds.

G. F. G.—The following are capital books of reference: "British Bees," by W. E. Shuckard, price 10*s.* 6*d.*, published by Lovell Reeve & Co.; "Ants and Bees," by Sir John Lubbock, price 5*s.*, published by Kegan Paul & Co. (one of the International Scientific Library Series). Consult also "British Insects," by E. F. Staveley, price 14*s.*, published by Lovell Reeve & Co.; also "Insects at Home," by the Rev. J. G. Wood, price 18*s.*, published by Longmans & Co.

H. H.—You will possibly obtain a copy of Waterhouse Hawkins' large diagrams of extinct animals, by applying to such scientific booksellers as Mr. William Wesley, 28 Essex Street, Strand, London, or Mr. W. P. Collins, 157 Great Portland Street, London, W.

G. A. G.—You will find a capital introduction to the British freshwater Algæ in Dr. Cooke's "Ponds and Ditches," price 2*s.* 6*d.*, published by the Society for the Promotion of Christian Knowledge.

T. H. C. H.—We are always pleased to insert original papers if they contain anything of value, but we cannot undertake to return manuscripts unless accompanied with stamps.

EXCHANGES.

Wanted, Coleoptera from foreign correspondents. Will exchange other Coleoptera and natural history objects, etc.—D. Dods, 47 Chepstow Place, Bayswater, London.

Large microscope with accessories, including series of Ross objectives. Also portable stand and student's stand, with good 1-inch and ¼-inch; present owner no further use for them.—F. W. Stoddart, Bristol.

Pectens from Hastings in exchange for other shells; also many duplicates of foreign shells.—C. L. S., Melrose, Quarry Road, Hastings.

Offered, "Nature," 1885, unbound; Cassell's "Natural History," vol. i. (Apes, Lemurs, Chiroptera, and Insectivora), unbound. Wanted, insect store boxes, also Lepidoptera and Coleoptera or tropical land shells.—B. Hudson, 15 Waterloo Road, Middlesbrough.

Micro material: what offers for hairs from musk-rat's tail? Wanted, Lepidoptera and Coleoptera.—B. Hudson, 15 Waterloo Road, Middlesbrough.

Wanted, any books or pamphlets relating to Ventriculites; good exchange.—F. Challis, 10 Broomfield Road, Chelmsford.

Scotch Graptolites offered in exchange for foreign shells, land or marine.—Miss F. M. Hele, Fairlight, Elmgrove Road, Cotham, Bristol.

For exchange: 1883-4-5 of Science-Gossip, unbound, clean, and as good as new; also vols. iii., iv., v., and vi. of "Boy's Own Paper," unbound, with plates and indices. Wanted, a good hen canary.—W. S. Castle-Turner, 6 Dagnall Park Terrace, Selhurst, S.E.

Fossils from the quartzite pebbles of the drift of Birmingham in exchange for fossils from Cretaceous, Red Crag, or offers.—A. T. Evans, 171 Cooksey Road, Small Heath, Birmingham.

WANTED, parts 5, 9, and 12 of vol. i. of the "Journal of Conchology." Exchange British shells, micro slides, or offers requested.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

FOR exchange, most gorgeous exotic butterflies, including *Morpho Cypris*, *Morpho Menelaus*, *Ornithoptera Darsius*, *Papilio Polyctor*, *Papilio Hector*, *Apatura Laurentia*, and about forty others in papers; also wings of *Morpho Cypris*, *Menelaus*, etc., for microscopic purposes.—Joseph Anderson, jun., Alre Villa, Chichester, Sussex.

L. C., 7th ed., offered, 89, 133, 135, 150, 169, 174, 236, 238, 245, 261, 350, 406, 532, 534, 575, 626, 627, 634, 810, 812, 823, 856, 931, 933, 1056, 1124, 1128, 1142, 1304, 1349, 1482, 1503, 1615, 1646. Many desiderata.—W. S. Harrison, 15 Park Place East, Sunderland.

WANTED parts 1 to 10, and 15 to 21, both inclusive, of the "English Illustrated Magazine."—L. Francis, 34 Brunswick Terrace, Grosvenor Park, Camberwell, S.E.

WILL exchange 6 vols. of "Design and Work," for vols. of the Chandos Classics (library edition), or offers in books.—L. Francis, 34 Brunswick Terrace, Grosvenor Park, Camberwell, S.E.

FIRST 15 parts of Cassell's "Our Own Country," for other books of equal value treating on literature, science, or art.—L. Francis, 34 Brunswick Terrace, Grosvenor Park, Camberwell, S.E.

WILL exchange Dec. 1885, and Jan., Feb., March, and April (1886) numbers of "Knowledge," for the December (1885) and January (1886) numbers of "Nature."—J. E. Gore, Ballysodare, co. Sligo, Ireland.

BRITISH birds' eggs: advertiser wishes to correspond with a collector in North Britain with a view to exchange specimens.—W. Gyngell, Wellington, Somerset.

OFFERED, cocoons (alive, healthy) of Promethia, foreign beetles and eggs, for rare old foreign stamps and British birds' eggs.—John Clapperton, Bridge Street, Galashiels.

"RECORDS of School of Mines," parts 1 and 2, vol. i., bound in cloth, for fossils from London Clay.—Owen Rees, 59 Sandbrook Road, Stoke Newington, N.

"SCIENCE-GOSSIP" for 1866, 1868, 1869, 1870, 1871, and 1872 bound, and 1882 to date unbound; also a large number of British and foreign shells and micro-slides. Wanted, books by Ruskin, Hamerton, etc., or offers.—S. C. Cockerell, 5 Priory Road, Bedford Park, Chiswick, W.

Littorina æstuarii, Jeff., offered for any other local species of marine, land, or freshwater shells.—W. Jordan, Cockfield, Sudbury, Suffolk.

"AMERICA REVISITED," by Sala, full of humorous cuts; "I've Been a-Gipsying," by George Smith, illustrated; Forrest's "Rock Sculptures on Rombald's Moor," pamphlet with lithographs, rare; MS. list of shells of Wakefield brought down to 1886; pair of crossbills alive; *Planorbis corneus* alive, for natural history books.—Geo. Roberts, Lofthouse, Wakefield.

OFFERED: herbarium specimens of marine Algæ, Bostrychia (Cystocarps and Tetraspores), Helminthora, Seirospora, etc. Wanted, Nemalion, Helminthocladia, etc.—T. H. Buffham, Comely Bank Road, Walthamstow.

WANTED, Cooke's "British Fungi." Will give Dr. Büchner's "Man in the Past, Present, and Future."—J. W. Williams, D.Sc., 27 Corinne Road, Tufnell Park, N.

WANTED, Cooke's "Rust, Smut, Mildew, and Mould." Will give Schäfer's "Essentials of Histology."—J. W. Williams, D.Sc., 27 Corinne Road, Tufnell Park, N.

ROSCOE'S "Chemistry," Jones' "Junior Practical Chemistry," Tilden's "Introduction to Chemical Philosophy" ("Text-Book of Science"), and Cooke's "British Fungi" (coloured plates), for shells or fossils.—Robert Cairns, The Grove, Currier Lane, Ashton-under-Lyne.

EXOTIC butterflies: many fine and rare species for exchange. Collectors please send duplicates and desiderata.—J. C. Hudson, Railway Terrace, Cross Lane, near Manchester.

TWO micro slides for each of the following numbers of SCIENCE-GOSSIP: Nos. 4, April, 1865: 38, Feb., 40, April, 1868; 53, May, 57, Sept., 1869; 66, June, 71, Nov., 1870; 74, Feb., 75, March, 1871: 85, Jan., 95, Nov., 96, Dec., 1872; and 126, June, 1875.—Samuel M. Malcolmson, M.D., 55 Great Victoria Street, Belfast.

WANTED, one or two specimens of obsidian implements; a liberal and varied exchange offered.—Edward Lovett, West Burton House, Outram Road, Croydon.

WANTED, a really good ⅛ objective; will give in exchange a first-class oxyhydrogen microscope for attachment to lantern front, has three powers, rack-work, etc., in mahogany box with lock.—John James Stead, Heckmondwike.

WANTED, unmounted microscopic material, viz.: any rare insects preserved in weak spirit, micro fungi or Foraminifera (British or foreign), of as many species as possible in exchange for live microscopic objects, viz.: *Hydra viridis*, *Melicerta ringens*, Desmids, and other pond-life as obtainable.—W. H. Pratt, 49 Dryden Street, Nottingham.

WHAT offers in books (history preferred) in exchange for "Engineering" for May to October, 1885, twenty-six numbers, including Inventions double number, and SCIENCE-GOSSIP, March to December, 1884? The whole in clean condition.—G. Stanton, Darwood Place, St. Ives, Hunts.

WANTED, natural history books; microtome; also book, "Edgeworth (M.P.) on Pollen." Will give in exchange first-class micro slides.—W. S. Anderson, 7 Granby Street, Ilkeston.

WILL send two dozen varieties of animal hair in exchange for other unmounted objects.—A. Harvey Williams, Hythe, Kent.

SCIENCE-GOSSIP for 1865, 1868; "Quekett Journal," vol. i.; "The Microscope," Hogg (new edition); "Natural History Review," 1865; "Buffon's Natural History," W. Smellie, 1828; "Valentine's Knife." Wanted, SCIENCE-GOSSIP, 1866, 1869–72, 1875–1879; "Naturalist's Library" (Jardine), odd vols.; good 3-in. and ½-in. objectives; diatom material; Newman's "Butterflies and Moths," or offers.—C. S. Bouttell, 7 Irene Road, Fulham, S.W.

WELL-BLOWN eggs of rare British and American birds for others not in collection.—J. T. T. Reed, Ryhope, near Sunderland.

EGG cabinet to exchange for English or foreign nests or eggs, photos of American Indians, Catlin's or other works on American Indians (not Schoolcraft's). Particulars of cabinet from—George A. Widdas, Woodsley View, Leeds.

A good ⅝ micro objective, 30° of angle, by Wheeler; as good as new; offers requested.—T. B. Forty, Market Square, Buckingham.

WHAT offers for three dozen microscopical slides and cabinet? Desiderata: *Pisidium fontinale*, *Valvata piscinalis*, *Helix lapicida*, *vertigo*, *Cyclostoma elegans*, etc.—W. E. Collings, Springfield Place, Leeds.

WHAT offers for Woodward's "Geology of England and Wales;" also "Manual of Mollusca"? Wanted, Eocene fossils. George E. East, jun., 10 Basinghall Street, London, E.C.

SPLENDID model horizontal engine, copper boiler, cylinder (2 in. by 1 in.), numerous cocks, etc.; cost £8. What offers? 40-inch bicycle.—C. T. Fennessy, Pallasgreen, co. Limerick.

WANTED, plants of *Cypripedium spectabile* or *Cypripedium insigne*, or other cool orchids. Will give in exchange British and exotic Lepidoptera and birds' skins. Also wanted, No. 2 of "Knowledge;" will exchange Lepidoptera.—Joseph Anderson, jun., Alre Villa, Chichester, Sussex.

SCIENCE-GOSSIP for 1872–1875, bound in two vols.; Nicholson's "Advanced Text-book of Zoology" (pub. 6*s*.), nearly new; Youman's "First Book of Botany" (300 illustrations); Robertson's "Daily Readings in Natural Science;" Dr. W. J. Hooker's "British Flora" (pub. 1835, but clean and complete); "Journal of Naturalist." In exchange for ornithological vols. of Jardine's "National Library."—J. H. Keen, 18 Church Street, Spitalfields, E.

Scalaria pretiosa and many other rare shells. What offers? Micro apparatus or slides preferred.—J. E., 3 Eton Grove, Dacre Park, Lee, S.E.

BOOKS, ETC., RECEIVED.

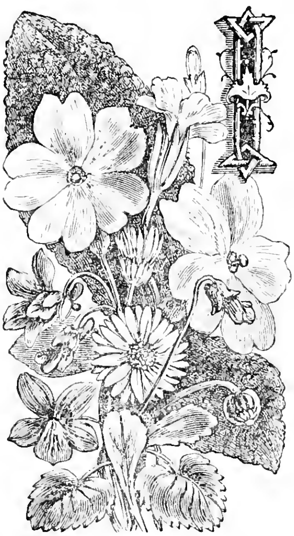
"An Intermediate Physical and Descriptive Geography" (London: Edward Stanford).—"Synopsis of the Natural Orders of British Flowering Plants," by J. W. Oliver (London: Simpkin & Marshall).—"A Photograph, and How to Take It," by A. A. Wood (London: E. G. Wood, Cheapside).—"Lecture Notes and Problems in Sound, Light, and Heat," by C. Bird (London: Relf Bros.).—"Journal of the Royal Microscopical Society" (April).—"Graphic Microscopy," No. 1, by E. T. Draper.—"Transactions of the Ottawa Field Naturalists' Club," 1884–85.—"The Scientific Enquirer," No. 3.—"Report of Bath Microscopical Society."—"Journal of Microscopy and Natural Science" (April).—"Illustrated Science Monthly."—"Annual Report of the Yorkshire Philosophical Society."—"Science."—"Journal of the New York Microscopical Society."—"The Canadian Entomologist."—"The Amateur Photographer."—"Ben Brierley's Journal."—"The Rochdale Field Naturalists' Journal."—"Feuille des Jeunes Naturalistes."—"The Garner."—"The Naturalist."—"Botanical Gazette."—"The Victorian Naturalist," Nos. 7, 8, 9, 10.—"The Midland Naturalist."—"Journal of the Quekett Microscopical Club."—"The American Naturalist."—"Proceedings of the Academy of Natural Sciences, Philadelphia."—"American Florist."—"Sixteenth Annual Report Wellington College Natural History Society." &c. &c. &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM: S. M. P.—S. H.—W. K. M.—J. W. W.—B. H.—F. W. S.—J. H. L.—A. W. H.—H. H.—S. A. B.—D. D.—A. G. McR.—A. P.—D. B.—W. B. R.—W. E. C.—W. H.—F. M. H.—J. E. L.—J. W. C.—C. L. S.—H. B. U. C.—C. F. W. T. W.—T. W.—W. H.—J. E. L.—F. M. H.—W. S. H.—R. F. M.—F. K.—W. F.—G. A. G.—J. A. jun.—A. H.—W. S. C. T.—T. D. A. C.—F. C.—E. L.—P. H. S.—Dr. H. W.—H. U.—S. F.—J. E. G.—W. G.—W. J.—A. T. E.—J. C.—W. B. C.—O. R.—M. T. M.—H. W. L.—S. C. C.—G. E. T.—T. H. B.—W. J.—J. T.—T. H. C.—J. R. B. M.—G. R.—G. F. G.—W. E. C.—G. E. E. jun.—T. B. F.—W. F. jun.—G. S.—J. C. H.—G. A. W.—W. H. P.—W. M. R.—A. P.—W. S. A.—A. H. W.—C. S. B.—I. T. T. R.—M. E. T.—A. H. W.—S. A. B.—R. C.—S. M. M.—J. W. W.—J. L.—J. J. S.—I. H. K.—J. A. jun.—C. T. F.—E. F. S.—J. E.—O. S.—F. R. L.—&c. &c.

ON MARINE COLLECTING WITH THE SURFACE-NET.

By Dr. G. W. M. Giles.

[*Concluded from p.* 111.]



It is curious to observe how the turning on of the air will revive an apparently dead organism. I once produced considerable amusement amongst my topographical colleagues in the Survey by this. A small branch of a hydroid zoophyte was under observation, and running over it, busily browsing on the expanded tentacles, was a small isopod crustacean. As long as the bubbles continued to pass, the tentacles remained expanded, gently moving in the current produced, while the isopod made greedy use of his time. But within a minute of its being turned off the zoophyte heads shrank up, the little cannibal dropped to the bottom of the cell, and both seemed to all appearance dead. On now again supplying the vivifying stream the zoophyte would be seen to gradually expand, and the crustacean to pick himself up and resume his feast as calmly as if nothing whatever had happened to interrupt it. This was repeated several times, until a too-protracted deprivation of oxygen killed the pair in good earnest.

If serious work be intended, as many species as possible should be accurately drawn, and for this purpose a camera lucida is an indispensable accessory: one of those forms which admit of the microscope being kept vertical being alone suitable for the purpose.

Most crustacea are provided with such a multiplicity of variously formed appendages that it is generally practically impossible to obtain a correct drawing of the whole while the animal remains entire. In order to overcome this difficulty it is a good plan, after drawing the body, the attachments of the appendages, and such of them as are clearly visible, to separate the limbs one by one from the body, by dissection under the simple microscope, and to arrange them in order on a glass slip. They can be then readily drawn to the same scale, and the separate drawings fitted on to that of the body in such positions as not to hide each other.

After the locomotive appendages have been separated, the gnathopoda may be dealt with in the same way, and drawn separately under a higher magnification, and the remainder of the body torn open and flattened out under a cover; a proceeding which will often enable one to ascertain certainly the sex of the individual.

During the process of examination and delineation it will be often found desirable to substitute direct for transmitted illumination, and to effect this change expeditiously I find no appliance so useful as the old-fashioned but much-neglected Luberkhun. To stop out the central rays of light I employ small discs of vulcanite, sawn out of a thin piece of sheeting. By simply wetting them, these can be made to adhere to any part of the under surface of the slide, and can be shifted about if necessary with the tip of the finger, without removing the slide from the stage. By alternately employing direct and transmitted light, many details of structure can be learnt which could not possibly be made out by either alone. It enables one also to fill in the natural colours in the finished drawing, which are quite lost by transmitted light.

And now, as to the readiest methods of preserving such organisms as permanently mounted microscopic objects. I fear I shall be considered unorthodox, but can only record my own impression, that Canada balsam and other resinous media are quite unsuited for the purpose. Soft, gelatinous creatures, such as Sagittæ, Salpæ, etc., are so shrunken by the action of

the turpentine or other clearing agent, that they become mere mummified caricatures of the originally plump structure. Animals provided with a chitinous armour suffer, of course, much less in this way; but even with them the shrinking action is very perceptible, and I can see no advantage whatever in resinous over glycerine mounting. Moreover, when the cell is of any depth, the intrusion of bubbles during the prolonged process of drying is a source of continual annoyance. On this account I am accustomed to use glycerine or glycerine jelly for all forms save shelled mollusca and worms. For the former glycerine is undesirable, on account of its action on their shells; for the latter, because for some reason neither this nor any other medium that I have tried preserves them in anything like their pristine beauty.

A strong solution of chloride of calcium, to which has been added a little glycerole of salicylic, or boracic acid, proved more satisfactory than anything else experimented with; but a good preservative is a great desideratum, as when first taken such things as Polynæ, etc., are amongst the most beautiful of our captures. For mollusks nothing is better than mounting in spirit; but in this hot climate such mounts lack permanence, so that chloride of calcium is usually used for them also.

A good supply of cells, of all possible depths—from a mere ring of cement to glass rings ¼ in. deep—is indispensable to the microscopist who wishes to preserve his captures permanently. The material of these is a matter of little moment, but for all except the deepest, where glass or vulcanite is preferable, I have come to prefer metal rings cemented with marine glue. Two points are important: first, to make use of cells no deeper than is absolutely necessary; second, to employ thin glass slips, in order that it may be possible to examine both sides of the objects under moderate powers. For cases where it happens to be specially desirable to be able to examine both sides, it is a good plan to have ready a number of cells, to one side of which a thin cover has already been cemented. By wetting the outer surface of this, it will adhere to an ordinary glass slide quite firmly enough to hold it while the process of mounting is completed in the usual way. When the cement has dried, the little box is placed in the opening in one of "Carpenter's" wooden slides, and retained in place by a couple of perforated labels. For this purpose broad-edged vulcanite cells are the best, as their large outer dimensions permit of the cement being inspected, and fresh coatings, if necessary, applied without disturbing the paper labels.

Before quitting the subject of mechanical *technique*, let me describe a method of obtaining thin sections of Entomostraca and other minute crustaceans, which is, I believe, somewhat novel. On account of their small size and the hardness of their chitinous coats, they do not lend themselves well to the paraffin method, as the knife is apt either to ride over them or to compress them, and drive out the paraffin filling up their interstices. Moreover, on account of the bulk of the apparatus and the difficulty of maintaining a constant temperature by means of spirit-lamps, it is extremely difficult in practice to carry it out on shipboard. The method to be described is, however, a somewhat rough and uncertain one, and it is only occasionally that results at all comparable to those of the paraffin method are obtained. It is, moreover, applicable only to very minute organisms. The course of procedure is as follows: The animal is taken from absolute alcohol and immersed in oil of cloves, where it is left until it is completely clarified. It is then placed in a watch-glass containing a few drops of Canada balsam (undiluted), and placed over a spirit-lamp at such a height as to melt without danger of burning the balsam. In about a quarter of an hour the balsam has driven out the clarifying agent, and penetrated throughout the entire structure of the animal. A single drop of balsam is now placed on a glass slip, and heated until it cools hard. Now take up the animal, together with a bead of balsam, on the point of a needle, and place it on the balsam on the slide, previously warmed, and prop it up in such a position that the plane of the sections desired may be parallel to that of the slide, holding it thus until the balsam has cooled sufficiently to keep it so.

There is just one consistency of balsam at which it may be readily sliced with a razor, without sticking to the blade, and yet is not brittle; and it is this condition which it is desired to obtain for the bead on the slide. Accordingly, when quite cold, it should be tested with the edge of a scalpel. If too soft, the slide must be warmed over the lamp for a while; if too hard, it must be removed from the slide and replaced in the watch-glass, to which a drop of fresh balsam has been added. In the difficulty of obtaining exactly the right consistence lies the uncertainty of the method; but, when this is hit upon successfully, really beautiful sections can be most easily obtained by slicing down the bead with a sharp razor or lancet, as in the ordinary hand method. The sections may be allowed to fall from the razor on to the slide until all the material is exhausted, and then covered with dilute balsam, under a large cover-glass, or they may be picked up one by one on the point of a needle, and arranged in order on a separate slide, which has been varnished with a thin coat of balsam so as to retain them in their respective places while mounting. The method is also useful for obtaining sections of coralline Algæ, whose structure, when deprived of their lime, is so rotten that it is extremely difficult to mount even the smallest sections whole, unless supported by some exceptionally firm imbedding material.

I have little more to add. The present papers are intended to be but a description of methods and

appliances that in the course of actual work have proved useful and readily obtainable.

Out here in India, scientific appliances can be purchased only in the presidency towns; and even in these the stock is of a most meagre and limited description. Hence, as it takes between two and three months to obtain anything from home, one's invention is very often stimulated by dire necessity. Rude, however, as some of the methods and appliances may appear, they have at least the merit of being inexpensive, and readily obtainable anywhere.

Did space permit, I should have much liked to have concluded with a few sketches of some of the queer monstrosities that get entangled in my toils, but I fear I must have already unduly tried the patience of my readers, and occupied far too many lines of their very useful "Gossip" journal. I hope, however, "if permission be accorded," as polite Orientals always say in making any proposition, to do this at some future time.

My main desire has been to show how easily surface-net work may be prosecuted, and how small is the "plant" required for the purpose; and thus to open up this most fruitful field of scientific entertainment to the large numbers of microscopists who annually visit the seaside, or make voyages of business or pleasure. Indeed I can imagine no more pleasant way of whiling away the monotony of a long sea voyage than this. As yet, what experiments I have made at devising a collecting apparatus for use at high speed have not proved particularly successful; but sufficient material may be generally collected during the halts necessary for coaling, re-packing cylinders, etc., to fully occupy one's spare time in the interval.

Marine Survey Office, Poona.

THE VARIATION AND ABNORMAL DEVELOPMENT OF THE MOLLUSCA.

Part III.

Terrestrial Gasteropoda (*continued*).

[*Continued from p.* 98.]

In *Limnæa* and *Helix* scalariform specimens are abnormal; but in *Scalaria hyalina* and other species, they are normal. According to the "Zoological Record" for 1880, *Helix rupestris*, a species not normally scalariform, is represented in the Isle of Syra by very numerous scalariform individuals and very few typical ones.

Taking cases of sinistrorsion, we find that:

(1.) Of all the genera of Mollusca a very few are sinistral; e.g. *Physa*;

(2.) of all the species of *Helix*, a normally dextral genus of Mollusca, a very few are sinistral; e.g. *H. lævipes*;

(3.) of all the specimens of *Helix hortensis*, a normally dextral *Helix*, a very few are sinistral; e.g. those found by Miss Hele near Bristol; and then again, according to Hartman, in the genus *Partula*, we find that in

(1.) *P. affinis*, one in several hundred is sinistral;

(2. (in *P. vexillum*, one in fifty is sinistral;

(3.) in *P. otaheitana*, the majority are sinistral; and

(4.) in *P. spadicea*, all are sinistral.

Helix nemoralis.—This most interesting species may be divided into groups according to the ground colour.

(1.) *rubella.* Shell pink or rose colour. This may again be divided into sub-varieties, according to the band-formula. My notes on the subject of band-formulæ are very incomplete, I fear; but I have the following forms of *rubella* on record for the district:—

rubella 00000. Minster (S.C.C.), Chislehurst, on fronds of *Pteris*, Farnborough. Not so common as might be expected.

,, 00_300. (Numbers below the line are meant to indicate bands developed very little, sometimes being confined to a mere trace near the lip of the shell.) Dartford, amongst ivy.

,, 00300. Ealing, Chislehurst, Minster, Dartford, &c. There is usually a light-coloured portion bordering the lower edge of the band, so that there is an appearance of a double band, the upper and larger portion being dark, and the lower portion light.

,, 003_40. One at Eltham.

,, 0030_5. Dartford, amongst ivy.

,, 00_{345} and 0_{2345}. Dartford, with the last.

,, 02345. Chislehurst, one specimen had the bands interrupted, but otherwise well marked; another had continuous bands.

,, $_12345$. Dartford. $_{12}345$. Ealing and Dartford.

,, 12345. Ealing, Kenley, Dartford, Chislehurst, Eltham, &c.

,, 120(45). One at Beckenham, but not found elsewhere in district.

,, 1(23)(45). Dartford (12345), Bickley; other gradations occur.

A monstrosity, caused by repair of fracture, found on Chislehurst Common, has a deep and rather wide umbilicus; it belongs to *rubella* 00000. A specimen of *rubella* 00300 from Minster has also a thin white line or band, nearly in the position of band No. 10 of a normal specimen; whether it is analogous to the

white band, often found running with No. 3, I do not know; but such is probably the case.

A shell of *rubella* $00_{3}40$ from St. Mary Cray is unusually thin, and is of a light pinkish yellow or flesh colour.

(2.) Shell orange colour. This might be called *aurantia*. I have only taken a bandless form, which is fairly common on a bank at Crayford.

T. D. A. COCKERELL.

August, 1885.

ON THE DEVELOPMENT OF THE TADPOLES OF THE COMMON FROG (*RANA TEMPORARIA*).

IN SCIENCE-GOSSIP, Vol. XVII. p. 59, there is an interesting article on frog-spawn and its development by M. H. Robson, Hon. Sec., North of England Microscopical Society. As he has so recently given us remarks, accompanied with plates, on the first stages of its development, I shall not dwell particularly on this portion of the subject, only sufficiently to show the difference in the time of development, owing to difference of temperature.

On March 11th, 1881, I procured some frog-spawn, and placed some of it in a fish-globe containing river water and aquatic plants, principally *Anacharis Canadensis* and *nitella*, and a smaller quantity of the spawn I placed in a shallow vessel containing about a pint and a-half of water and some Anacharis. The two vessels were kept in a room with a fire in it all day, and the aspect south-east.

Now if you will compare M. H. Robson's account with mine, you will see the difference of time in the development.

March 11th, *in situ*. 13th, cleavage or segmentation of eggs; 14th, much larger; began to move and turn their heads and tails together in their efforts to free themselves from the gelatinous egg mass which surrounded them; 18th, tadpoles had emerged; 21st, external gills (branchiæ) disappeared; 22nd, all took to floating on their backs, and continued to do so for some days. I could see their viscera as shown in Fig. 75. 23rd, viscera as shown in Fig. 76. I could see that their bodies were beautifully splashed with golden colour. Up till the 23rd those in the shallow vessel had kept pace in growth with those in the fish-globe, after then they did not increase either in length or breadth for a fortnight, at the expiration of which time I removed them into a vessel containing about three times the quantity of water, with more weed, for, although I wanted to keep them back, I did not wish them to die. They immediately made a fresh start, but never grew or developed so quickly as those in the fish-globe, so that when those in the last-named vessel had become lung-breathing batrachians, which some did as early as May 26th, and the last of that lot by the middle of June, I removed those in the smaller vessel into the fish-globe, and they did not fully develop until the end of August; these later ones grew to be much larger as tadpoles (also as frogs) than the earlier ones. I found it very interesting to examine them under the microscope. They can be easily kept quiet by adopting M. H. Robson's plan, or when quite small one can be placed in a cell, but it should not be left to remain in there longer than necessary for examination, or it will die. I had one in a cell one evening, and left it until the following evening, when on placing it under the microscope, to examine its branchiæ, I found the circulation had quite ceased in that on one side of the head, but was flowing rapidly in the opposite one. I judged it was dying, and such was the case, for it immediately expired. I was much vexed to think that through my thoughtlessness the little creature had died.

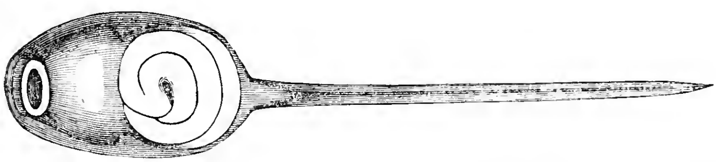


Fig. 75.—Tadpole, twelfth day (much enlarged).

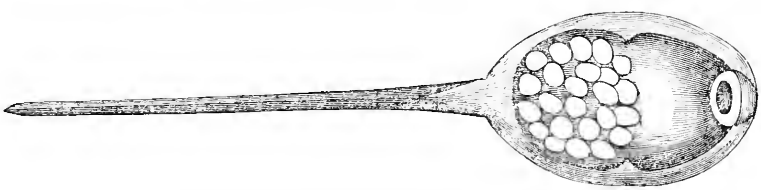


Fig. 76.—Tadpole, thirteenth day (much enlarged).

I used to watch their movements with much interest, and speculate on the causes which affected their actions. I found light, temperature and aliment had much to do with them. On dull cold days the tadpoles would be seen at the lower part of the vessel, moving about slowly, and even hiding under the stones

and débris there ; quite the contrary on bright sunny warm days, which seemed to act as a stimulant on them, for they would come more to the top of the vessels, and move about quickly, and in the act of feeding their little mouths would work up and down with rapidity.

Taking into consideration that when tadpoles were in a pond in a natural condition they must necessarily have a variety of food—whatever a sudden gust of wind or chance might place in their way, such as dead mice, birds, etc.—I procured as much variety for them as I could, and I found them very quick to discover anything different in the shape of aliment to what they were used to having. A little finely chopped hay, sprinkled on the top of the water, they would discover immediately, and it would busy them for the rest of the day. Dead caddis-worms and dead water-snails they greedily devoured ; in fact nothing came amiss to them in the form of decaying animal or vegetable matter, for they are thorough scavengers, and follow out this law of their nature, even to eating their dead relations.

I used to give them meat nearly every day, and found, quite contrary to what M. H. Robson says, that they eagerly seized on it. I used to take a piece of raw beef, mutton, or lamb, about the size of a large marble, and tie it on to the end of a piece of thread, so that I could easily draw it out of the water, for if left in too long the meat will foul it. I then lowered the meat into the water ; soon the tadpoles would all get together, but quite in the opposite direction to where it was. They would seem very fussy and uncertain what to do, until one would come forward and attack the meat ; the rest would immediately follow, and during the rest of the day the meat would be covered with them ; and when in the evening I went to take out what was left they would not relinquish their hold of it until they found themselves in the air, and then they would drop back into their native element. The meat used to be considerably torn about and much diminished. M. H. Robson evidently had not the time to devote to watching his tadpoles as I had to watching mine, so, on finding the meat not wholly consumed, came to the conclusion that they did not appreciate it.

Mr. Fullagar, whose name is well known to the readers of SCIENCE-GOSSIP in connection with Amœbæ, etc., witnessed the aforementioned statement,

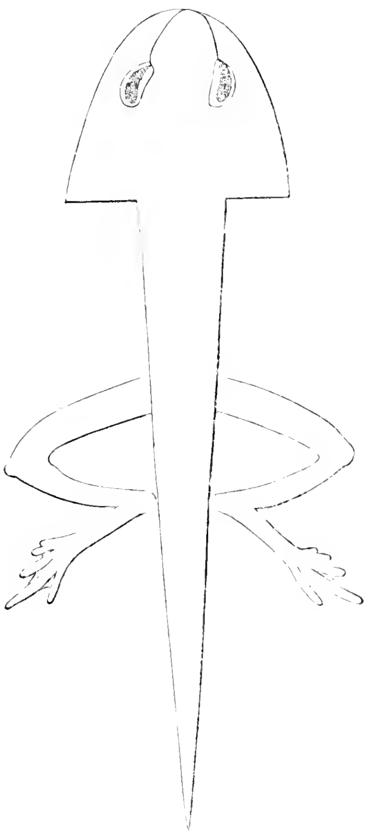


Fig. 77.—First Frog Stage (enlarged).

Fig. 78.—Second Frog Stage (enlarged).

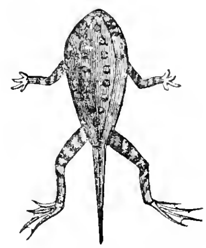


Fig. 79.—Third Frog Stage (natural size).

Fig. 80.—Fourth Frog Stage (natural size).

and he laughed heartily at the tenacity with which my little captives would cling to the meat.

One day I put one of my fingers into the water; it was soon surrounded by my ever-hungry pets, who, in their efforts to gain nourishment from it, caused a titillation not altogether pleasant to bear for any length of time. After I had tried them every day for a week they would not come near it, they were evidently conscious from past experience that my finger was too hard for their little horny processes to make any impression on.

Sometimes I have seen two tadpoles meet and put their mouths together and remain in that attitude towards each other for quite one minute, as if they were holding some friendly communion; then they would separate, slowly gliding past each other. Often I have seen one go off at full speed as if some sudden frenzy had seized it, and go the round of the globe several times, and then as suddenly stop. Could it have been in pursuit of anything; or could a sudden fear have seized it, or only a little exuberance of spirits?

For some time before their posterior limbs protruded, they, as well as the fore-limbs or graspers, could be seen forming underneath the translucent skin which envelopes the tadpole; then the toes protruded, and in a few days the whole of the posterior limbs and the body assumed the form as represented in Fig. 77. In some three or four, and in others only one day would intervene before the graspers would be suddenly put forth, and then the body, head and posterior limbs would assume a more rounded appearance, as represented in Fig. 78. At this stage of their life-changes they presented a most helpless appearance, constantly panting and resting on the aquatic plants near the surface of the water, with their graspers in the position shown in Fig. 78. Many died, and were greedily devoured by their surviving relations not yet so far advanced as themselves. I never found any eating those which were in the same stage of development as themselves. When the tadpoles arrived at the stages represented in Figs. 79 and 80, they found their way on to the cork which had been placed on the top of the water for the reception of the young batrachians. I then found it necessary to remove them (if I wished to save any from the jaws of death) to a vessel where there was less water and a larger resting-place; but not any lived longer than six weeks. The difficulty was how to feed them. I procured small insects off plants, gave them crumbs of bread, and tried them with minute pieces of beef, and upon one occasion I induced one frog to eat a piece. I have been told since that they can be kept alive on boiled livers.

The tadpole's tail did not become absorbed so quickly as I had been made to expect: it went through quite three stages, until nothing of it was to be seen but a knob at the lower part of the back of the young frog, and even that took some time before it disappeared.

I took sketches and watched particularly these latter transformations of the tadpole, because I was told that they dropped their tails and turned into frogs, and I find many educated persons (even men) believe such is the case. On showing my sketches to a gentleman, he asked if I was quite sure they were not different families of the same species. How is it educated persons know so little of what are common objects of natural history? Because "ea sub oculis posita negligimus; proximorum incuriosi longinqua sectamur." I ask, Why disdain to study those things which nature broadcasts around us, simply because they are common, as long as their habits and economy (which are most wonderful and interesting) are as great a mystery to many of us as those of the rarest?

CLARA KINGSFORD.

Canterbury.

LEPIDOPTERISTS' WORK FOR JUNE.

By W. FINCH, JUN.

THE beautiful leafy month of June is now at hand, and the numbers of insects are steadily increasing. The lepidopterist to fill his boxes and to study his captures will have to work night and day. Indeed, in the midst of the mass of work around him, he will very often have to stop to consider what he shall do next. The energetic worker and true lover of nature will by this time have a pretty numerous collection of insects, and should be able to show a quantity of notes in his diary. Let him not fail in this latter respect, for he will derive much pleasure from the perusal of them at the end of the year, and will also be instructed by them what to do and the best way of doing it, in the following season.

We must now be out in the hot sunshine with the net; out in the darkness of night with the net, lamp, and treacle-pot; up early in the morning setting out our captures of the previous day or night, and then off for an hour at the fences and tree-trunks. And so on throughout the whole season, work, work, work; from now it will be all hard work. But you may depend, that however much we may feel inclined to grumble now at the continual worry and work, we shall not do so at the end of the season, providing that we have had moderate success.

Many and varied are the beautiful forms of life we shall see this month, some of them too are curious; all of them teach lessons, and I believe were meant to do so when they were first created. If not, then why was so much care and wisdom shown in their construction? How each little life is complete in itself, and yet is merely the forerunner of another life to come, each more and more wonderful than the one left behind. In the insect life, and especially in the life of the lepidopterous insects, I always feel that God intended a parable. For the lives of these small

creatures are strangely symbolical of our own: first the germ or egg, from which springs an active creature, a voracious, greedy, earthly thing, which, after living a changeful life sinks into sleep, as it were into the tomb; here it lies a curious thing, inert, utterly helpless, yet not entirely at the mercy of the outer world, for during its former life it was taught and given opportunity to prepare for itself suitable protection, so that there shall be no spot or blemish to mar its future beauty when as an ethereal being it wings through the upper air, all beauty, purity, and grace. Indeed the lepidopterist may always find much in his favourite insects for admiration, wonderment, and serious contemplation.

A look-out must still be kept for ova; many eggs now taken will soon hatch. When a butterfly is seen flitting along in a pensive sort of way over the herbage, and now and then settling thereon, it will often be found that it is a female, and is in the act of depositing its ova. Female moths taken on the wing will as a rule be impregnated, and if it is wished to rear the species thus taken, the moth should be kept alive until she has deposited her ova. A spray of the larval food-plant will be a great inducement to this end. Those of my readers who are microscopists will find in these insect ova some very beautiful objects for their study.

Larvæ reared from the egg should in the earlier stages be confined in fine muslin bags and fed therein. Many young larvæ have a propensity to wander, and in a breeding cage are thus lost; whilst when kept in bags all their attention is concentrated on the food, and they cannot wander.

Many larvæ are to be found this month. Strange and weird are some of them in appearance, some even appalling; others are resplendent in vivid colouring and velvety coats. Now is the time for larvæ preserving. The lepidopterist should work hard at this particular branch of his study, for the tempting time will soon be over. The beautiful larva of *P. machaon* is now to be found in the fen districts on *Peucedanum palustre*. This larva cannot, unfortunately, be reared away from its marshy home. *T. betulæ* is to be found too on sloe-bushes near woods; also *G. rhamni*, on the buckthorn. Nettles will produce the larvæ of the Vanessidæ this month. Those curious fellows, *N. ziczac*, may also be found in their various hues, feeding on a variety of trees. Old junipers in shrubberies should be searched for *E. sobrinata*; *C. ligniperda* may be taken at night with the aid of the lantern—and the nose—on willows.

With regard to pupæ; we shall now be able to look for the pretty angular chrysalids of the butterflies; the pupæ of moths enclosed in their variously constructed cocoons, attached to the stems of grass and low herbage, to the twigs and branches of trees; and in some instances we must look for cocoons under the ground.

The number of imagos to be taken this month is often bewildering to the tyro. It would be useless to enumerate any species here, as there are so many "good things" to be taken now, and our space is limited. We will content ourselves with just mentioning the best methods and places for securing specimens. The long and brilliant days of June promise excellent sport to the energetic worker. It is hot work wielding the net this month, and those wretched pests, the flies, are so aggravating; if however, the face be anointed with a solution of camphor or borax these little nuisances will be kept somewhat in check; a smoker need not fear them.

In day searching, the beating-stick must be ever at hand; always beat shrubs and bushes from below, beating from above has the effect of driving the moths further down into the bush. Have an eye to sweet-scented flowers, also thistles, ragwort, and blackberry blossoms; but beware of the thorns. The exudations from cossus-infected trees, and also the gummy matter from fruit-trees are an attraction for butterflies and moths alike. Lime and other trees which bloom this month should receive every attention.

Some collectors sugar flowers by day for both butterflies and moths; I cannot recommend it, however, never having tried it myself. Treacling by night may again be resorted to, and is a profitable mode of capture. Do not sugar too many trees, or too close together. Do not give the moths time to fill themselves with the sweets, for such will invariably cause discoloration and grease in the specimens at some time or other. Some will tell you that it is of no use to treacle on a moonlight night; I have found such nights often more productive than others. If there be slight rain and threatening of thunder, so much the better for treacling. Beware of the bats, for they will pick off the moths from your treacles if you do not watch; look out for toads too at the foot of the tree; these knowing rascals seem to understand the treacling business quite well, and it is "all up" with any moth that chances to fall to the ground. "Light" will be useful for capturing; many good insects are thus taken. Fences and tree-trunks as before—"only more so": many moths have a habit of sinking their bodies into crevices of the bark, and extending the wings pressing them quite flat. These are rather difficult to find, but once get used to it and you will be able to pick them out on a tree a great distance off. It is always as well after examining a tree to give it a sharp blow before leaving, it will often bring forth something we little expected. There is a sort of honey-dew on many low-growing plants (nettles, etc.), this is often an attraction to moths; plants so affected are often seen covered with ants; these little creatures seem exceedingly fond of this sticky exudation.

If a male insect be seen when flying to dart suddenly and quickly into a bush, it should if possible be traced, and will often be found paying attentions to

a wingless, grub-like lady of its own species. This is a good way to procure these wingless female moths, which otherwise would not be found, for they are strange "stay-at-homes," often remaining altogether on the cocoon from which they have emerged, patiently awaiting the advent of a sweetheart.

158 *Arkwright Street, Nottingham.*

ON SOME SWISS SPECIES OF CORYDALIS.

AMONG the early March and April flowers which carpet the lower slopes of the Swiss pastures, orchards, and valleys, the several species of Corydalis are truly remarkable. As soon as the grass begins to grow, and that marked change in verdure takes place which is a herald of the early Swiss spring, thousands of shoots appear from the hidden bulbs of the Corydalis. Rapidly the leaves expand, and the flower-spikes unfold, covering the meadow with

Fig. 81.—*Corydalis cava.*

delicate blossoms of the most varied shades of colour—crimson, purple, pink, cream or pure white, standing in great contrast to the blue-green of the deeply cut glaucous leaves. On the undulating slopes, beneath walnut, apple, or chestnut, the surface of the ground is literally a blaze of colour, so thickly grows the Corydalis; and this is before March has given place to the more genial April.

Corydalis cava is the species so commonly distributed in Canton Vaud, while the *C. solida*, a plant even more attractive and graceful, is characteristic of Canton Valais. The two species are frequently confused, but can be readily distinguished if compared with each other. The most evident distinction lies in the shape of the bracts, which are digitate as regards *C. solida*, and entire in *C. cava*: the flowers of *C. solida* are sweet-scented, the other is scentless. All Swiss species of Corydalis are bulbous with the exception of *C. lutea*, a species growing on old walls surrounding the vineyards, in warm and sunny situations.

There should be little difficulty in distinguishing between the genera Fumaria and Corydalis: the

Fig. 82.—*Corydalis lutea.*

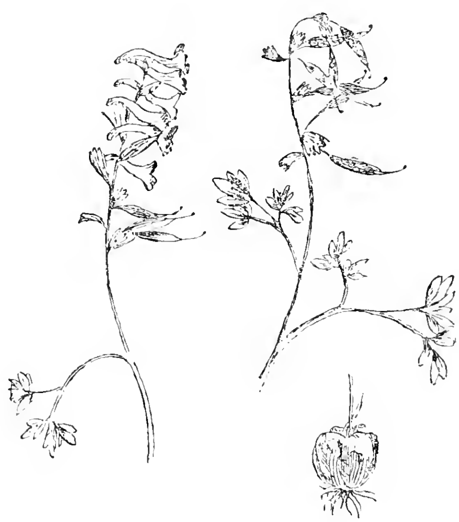


Fig. 83.—*Corydalis solida.*

former has silicules, the latter siliques; in this respect the order Fumariaceæ borders on the cruciferous plants.

Genus Corydalis, DC.: sepals 2, dehiscent; corolla, 4 petals, irregular, hypogenous, connivent; the two lateral ones joined at the summit, the superior one prolonged into a spur; stamens 6, hypogenous, in two groups; anthers prominent, the two lateral ones in each group 1-lobed, the centre one 2-lobed; ovary free, 1-celled; styles joined in one filiform column; stigma bilobed; fruit a silique, 2-valved, many-seeded; grains shiny or black. Leaves alternate, without stipules; flowers with bracts. Plants perennial.

α. root bulbous, stem simple.

β. root fibrous, stem branched.

α.

1. *C. cava*, Schw.: bulb becoming hollow with age, and covered with small fibres above. Flower-stem solitary or numerous, without scales at the base; leaves bi-ternate, with blunt segments; bracts entire, spur somewhat inflated and bent; corolla purple, pink, or white; pedicel three times shorter than the capsule; plant glaucous. March—April.

2. *C. fabacea*, DC.: stem with a scale at the base; bracts entire; spur prolonged and straight; leaves ternate. May.

3. *C. solida*, Sm.: (*C. digitata*, Pers.), stem with one or two scales; bracts digitate; spur less inflated and bent; bulb small, with fibres at the base; leaves bi-ternate, with rounded segments; corolla crimson, pink, slate-grey or white. March—April.

β.

C. lutea, DC.: leaves bi-tripinnate; segments obovate, entire or trilobed; bracts linear; entire spur blunt; flowers in a one-sided raceme, yellow; grains black. April—May.

C. Parkinson, F.G.S.

HISTORY OF THE STRAWBERRY.

By H. G. Glasspoole.

THE strawberry is the earliest of our summer fruits, and its appearance is as welcome as its flavour is agreeable. This plant is widely diffused, being found indigenous almost throughout Europe, and indeed in most parts of the Temperate Zone. Botanically the strawberry belongs to the genus Rosaceæ or Rose tribe, and the part we eat is not a berry or even a fruit, but is merely a fleshy receptacle, the true fruit being the ripe carpels which are scattered over its surface in form of minute grains, looking like seeds, which they really are not, for the seed is enclosed inside of the shell of the carpel. This is exactly the contrary to the raspberry: here you throw away the receptacle under the name of the core, never suspecting that it is the very part you had been feasting upon in the strawberry. In one case the receptacle robs the carpels of all their juices in order to become gorged and bloated at their expense, in the other case the carpels act in the same selfish manner upon the receptacle (see Lindley, "Ladies' Botany.") In ancient history we do not find the strawberry mentioned by the old Greek authors, and it is but slightly so by Virgil, Ovid and Pliny. The first author, in his third Eclogue enumerates it as one of the beauties of the field, and Ovid, speaking of the simplicity of living during that happy period which existed only in the poets' imagination—the "Golden Age"—says the people were

"Content with food which nature freely bred,
On wildings and on strawberries they fed."

Pliny only mentions it in connection with the arbutus-trees. In book 15, chap. 24, he says the tree is termed the strawberry-tree; and there is not any other tree that gives fruit which resembles the fruit of an herb growing by the ground. There is no mention of its being cultivated, but Soyer tells us that both Greeks and Romans were fond of it, and both applied the same care to its cultivation, and that it graced the tables of the Luculli by the side of its more humble sister the wild strawberry; but this author gives no statement on what authority he gets his information.

The strawberry does not appear to have been cultivated in the early days of English horticulture, probably from the fact that it was found plentifully as a wild fruit in the woods, and thence brought to towns and sold in the streets and markets, as it is in the present day in Italy and other parts of Europe. The earliest record we have of this fruit is mentioned in the household rolls of the Countess of Leicester for the year 1265. This fruit was known in London as an article of ordinary consumption in the time of Henry VI. In a poem of that age called "London Lyckpeny," by John Lydgate, who died about 1483, he mentions that "Strabery rype!" was one of the street cries of that period.

From the chronicles of Holinshed, published in 1577, we learn that strawberries were cultivated in the gardens of the Bishop of Ely in Holborn about the year 1483. Ely Place, Holborn, was the ancient site of the stately palace of the Bishops of Ely. The gardens and grounds were forty acres in extent, and celebrated for their roses, saffron, crocuses, and strawberries. Holinshed describes a scene in which these gardens and fruit are introduced, which was afterwards dramatised by Shakespeare in his plays. The old historian refers to the conduct of Richard III., then Duke of Gloucester, on the morning of the execution of Lord Hastings, sitting with others in council devising the honourable solemnities for the king's coronation. Gloucester, after talking with them, said to the Bishop of Ely, "My lord, you have very good strawberries in your garden in Holborn. I require you to let us have a mess of them." "Gladly, my lord," quoth he; "would God I had some better thing as ready to your pleasure as that;" and therewith in all haste he sent his servant for a mess of strawberries. The garden in Holborn was at that period one of the most celebrated in the kingdom: it seems to have been an object of great care with the episcopal owners, for in the reign of Elizabeth we find that the Bishop of Ely was obliged to grant it on lease to Sir Christopher Hatton, stipulating for the right of walking in it and gathering twenty bushels of roses yearly.

From the Hampton Court accounts in the time of Henry VIII. we learn that strawberry roots were sold at 4*d.* per bushel, and were no doubt plants of the wood strawberry. Tusser, who wrote in the

latter part of this reign, in his advice to the farmer in giving directions to his wife, says—

"Wife, into the garden, and set me a plot
With strawberry roots of the best to be got:
Such growing abroad among the thorns of the wood
Well chosen and picked, prove excellent good."

This same old author mentions that when thus transplanted the best spot in the garden to cultivate them is under other shrubs; thus he says—

"The gooseberry, respis, and roses all three,
With strawberries under them fitly agree."

Thomas Hyde, writing in 1523, informs us that "this fruit be much eaten at all men's tables in summer, and they grow in gardens unto the largeness of a mulbury."

At the beginning of the seventeenth century there was another celebrated garden in Holborn, which was then the most aristocratic portion of London, belonging to Gerard, where he appears to have cultivated this plant. In his Herbal he says "Strawberries grow upon hills and valleys, likewise in woods and other places which be somewhat shadowie. They prosper well in gardens." He also mentions white and green varieties, but which are only to be found in gardens. Strawberries are mentioned by Spenser in "The Faërie Queene;" and Shakespeare says

"The strawberry grows underneath the nettle;
And wholesome berries thrive and ripen best
Neighboured by fruit of baser quality."

This occurs in "Henry V." (act. i. sc. 1). The Bishop of Ely, in speaking of the young king, likens his good qualities, which lie beneath the surface, to the charms of the fruit which are overshadowed by noxious weeds.

In an article on this fruit in the "Gentleman's Magazine" for 1879, by W. Collett Sanders, he informs us that Sir Philip Sidney, in his "Arcadia," published 1590, was the first writer who mentions the inimitable combination of strawberries and cream. In describing a milk-white horse, Sir Philip says that upon his shoulders and withers he was freckled with red stains, as when a few strawberries are scattered into a dish of cream.

We find one of Ben Jonson's personages saying, "My son hath sent you a pot of strawberries, gathered in the wood, to mingle with your cream." The strawberry at this period must have been generally cultivated; and it appears a strange statement that John Tradescant the elder, who was gardener to Charles I., and the Paxton of England in those days, first saw the strawberry as a cultivated and cherished plant in a woman's garden near Plymouth, whose little daughter had transplanted it from the woods for the sake of its beautiful flower and fruit. Forced strawberries and cherries are mentioned as being served at an installation dinner at Windsor, 23rd of April, 1667.

(To be continued.)

NOTES ON NEW BOOKS.

Bees and Bee-Keeping: Scientific and Practical. Vol. i. Scientific, by Frank R. Cheshire, F.L.S., etc. (London: L. Upcott Gill). Of late years bee-lovers cannot complain of want of literature. Almost every bee-master has thought it necessary to write a little book on the subject. The consequence is there are few good ones. Mr. Cheshire is well known for his scientific as well as practical knowledge of bees and their diseases, and this volume presents us with the scientific aspect of bee-life. It is a beautifully got-up work, full of original and well-drawn illustrations. In short, it really deals with the physiology and natural history of the bee, and we have sincere pleasure in recommending it to both naturalists and apiculturists as by far the best manual of the subject extant.

Outlines of Geology, by James Geikie, LL.D. (London: Edward Stanford). From a comparative dearth of really good manuals on geology, all of a sudden there has issued a rush. Perhaps this was because so many good geologists and teachers found out the want at the same time. Thus we have had manuals from Duncan, Seeley, Etheridge, Prestwich, A. Geikie, and now another from James Geikie. All of them are excellent, and in no science is the student now better off for guides than in geology. Dr. James Geikie's new book is specially calculated for young beginners, and the patient, thoughtful manner in which he has laid himself out to fully explain those parts which beginners find it most difficult to understand, will earn him the gratitude of the latter. No better "introduction" to the science of geology exists in our language.

Upland and Meadow: a Poactquissing's Chronicle, by Charles C. Abbott, M.D. (London: Sampson Low & Co.). Dr. Abbott is an old friend and contributor to Science-Gossip, and his pleasant papers will be remembered by hosts of our readers. We are therefore all the more pleased to congratulate him on the great success which the present volume has obtained on this side the Atlantic. It is altogether a delightful book, reminding one of Thoreau, but containing more accurate zoological and botanical knowledge, and possessed besides of a peculiar humour, not American after the common use of the term, but the overflowing pleasure which breaks into laughter. We cordially recommend our readers to forthwith procure this charming volume of natural history essays for themselves.

British Fungi, by the Rev. John Stevenson, in two vols. Vol. i. Agaricus–Bolbitus (London and Edinburgh: William Blackwood & Sons). The author is the author of "Mycologia Scotica," and Hon. Sec. of the Cryptogamic Society of Scotland, so that he comes before the public with good credentials. This is a first-class manual, intended for earnest students, not mere dilettanti; but an excellent work of refer-

ence notwithstanding. Dr. Cooke's two volumes on the subject fetch high prices, which is a good indication of their rarity, and of the necessity for a book like the present to be published. The woodcut illustrations are neat, artistic, and accurate, as one would naturally expect, seeing that they are all the work of Mr. Worthington G. Smith. Mr. Stevenson has laid all possible authors under tribute, and he shows himself admirably capable of acting as a mycological guide to the British fungi. This volume will be an acceptable addition to every botanical library.

Our Island Continent: a Naturalist's Holiday in Australia, by Dr. J. E. Taylor, F.L.S. etc. (London: Society for Promoting Christian Knowledge). Our position with regard to this little book precludes our doing more than announcing its publication. The chapters are as follows: 1, Outward Bound; 2, The Indian Ocean; 3, First Glimpses of Australia; 4, South Australia: Adelaide; 5, The Environs of Adelaide; 6, In the Bush; 7, Victoria: Melbourne; 8, The Environs of Melbourne; 9, Victorian Wanderings and Ramblings; 10, Australia Felix; 11, A Visit to the Crater Lakes of Western Victoria; 12, The Victorian Forests; 13, Cobb's Coaches: on the Road; 14, Overland; 15, New South Wales: Sydney; 16, The Environs of Sydney; and 17, The Blue Mountains.

The Naturalist's Diary: a Day Book of Meteorology, Phenology and Rural Biology, by Charles Roberts, F.R.C.S. (London: Swan Sonnenschein & Co.). This book admirably carries out a capital idea. It is practically a ready work of reference to the climate and general natural history of the British Islands. The introduction covers very extensive ground, including health resorts, climates, periodicity of natural phenomena, migration of birds, etc. Each day of the year has a column assigned to it, showing the average or mean temperature, maximum and minimum, in sun and shade, mean barometer, rainfall, the plants and trees usually blossoming, what plants to look out for, the trees and shrubs leafing, insects, larvæ, etc. appearing; birds migrating to and from, singing etc.; what animals are seen, shooting, fishing, sports, etc. From all of which the reader will see that this is a most useful and handy book of reference.

Mind-Cure on a Physical Basis, by Sarah E. Titcomb (Boston: Cuppler, Upham & Co.). We confess we do not like meddling with these subjects, but we were attracted by the earnestness of the author to read sufficient of this book to see that it differs much from all previous works on the subject. The author holds that she can cure disease simply by concentrating her mind upon the thought that the patient has no disease, and she thinks this method can be used by anybody. We have not had time to try it.

The Young Collector: "Sea-weeds, Shells, and Fossils," by Peter Gray and B. B. Woodward; and "English Coins and Tokens," by St. Jewill and B. V. Head (both by Messrs. Swan Sonnenschein & Co.). Although neither of these handbooks comes up to the unusally high character of Mr. Bagnall's work on Mosses, they are nevertheless admirable helps to young students, to whom their cheap price (one shilling) will be very welcome.

An Intermediate Physical and Descriptive Geography (London: Ed. Stanford). This little book is intended for school use, and is abridged from the well-known and larger "Physical, Historical, and Descriptive Geography" of the late Mr. Keith Johnston. We have long held the latter work to be the most admirable scientific treatise that ever appeared, and we are glad that this smaller work, containing the method which made Mr. Johnston's work valuable, is based on the same lines.

Official Year-Book of the Scientific and Learned Societies of Great Britain and Ireland (London: Chas. Griffin & Co.). This is the third annual issue of a valuable and handy book of references. It gives a list of the papers read during 1885 before societies engaged in fourteen departments of research, with the names of their authors; and there is besides a full and copious index. It also contains notices of the various Government departments of science, such as the Royal Observatory, Geological Survey, etc.

Malvern: its Flowers, Ferns, Butterflies, Minerals, Fossils, and Birds, by C. E. Mackie, M.A. (Malvern: "Advertiser" Office). This is a neat, well-printed, and altogether nicely got up little field handbook, absolutely necessary to a naturalist visiting the Malverns. In view of the next meeting of the British Association at Birmingham, when, among the numerous excursions, one or more is sure to be made to this interesting district, the issue of this little manual is very opportune.

Photography for Amateurs, by T. C. Hepworth, F.C.S. (London: Cassell & Co.). Mr. Hepworth is never more at his best than when he is retailing his large experience for the use of beginners in the sciences he has studied. There are few pursuits more generally popular than that of photography; and, although there are several capital little books known to amateurs, we do not know of any so cheap or practically useful as the one before us. We specially recommend it to ladies who have now added amateur photography to their numerous accomplishments.

Another old contributor to our magazine—a man whom Dr. Samuel Smiles made known to the public some years ago, Mr. Thomas Edward, of Banff—has just died at the age of seventy-two. Edward was a thorough, open-air naturalist, one to whom science was dearer than gold or comfort, or even fame. He lived a happy, useful, and honoured life, although he never earned a pound a week.

CHAPTERS ON ANIMAL PARASITES.

By W. A. Hyslop.

No. II.

CLOSELY allied to the Diptera, though even the traces of wings seem completely lost, are the Aphaniptera, or fleas, a large and important division of parasites, and, so far as I know, except for various articles in magazines, undescribed. A number of species are described and figured in SCIENCE-GOSSIP for 1871, p. 100. I do not intend entering upon any description of the Aphaniptera, but would merely point out that there is much scope for research in this branch of entomology, as the various writers who mention fleas show great variety of opinion as regards the number of different species, some describing about twenty varieties, while others, such as M. Megnin, only mention about ten. M. Megnin seems to consider that the species of other authors are all identical with one or other of those described by him. The size and number of combs on the head and thorax seem one distinguishing feature. Among the fleas should be mentioned the chigoe of South America, the female of which burrows below the toe-nails, and causes much annoyance and pain.

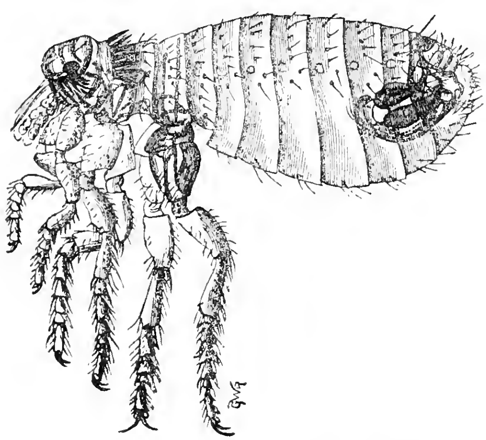


Fig. 84.—Flea of Dog (*Pulex canis*), male enlarged.

Fig. 85.—Flea of Mole (*Pulex talpa*), male, enlarged.

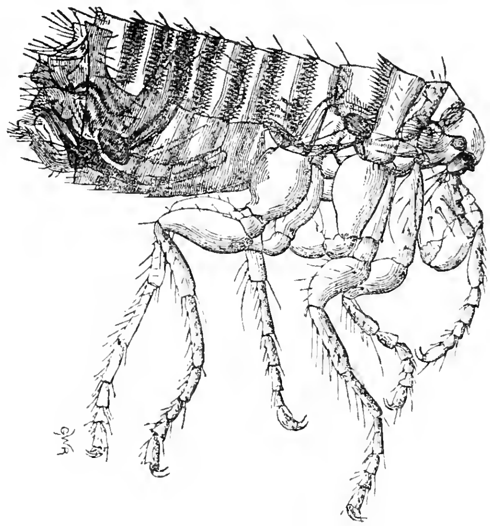


Fig. 86.—Flea of Bat (*Pulex vespertilionis*), male, enlarged.

Fig. 87.—Chigoe (*Pulex penetrans*), enlarged.

Passing over the Heteroptera, or bugs, which do not fall under the definition of parasite adopted in this article, we come to the Anoplura, or lice, and it is to this division I wish more particularly to draw attention. Before doing so, however, we may briefly consider the remaining kinds of animal parasites, viz. those of the genera Ixodes and Acari.

The Ixodes, or ticks, are well known, and species may be found on most of our quadrupeds, notably the dog. They should, if one adhered closely to the definition of parasite already given, be excluded, as they live in the grass and underwood, and fix themselves to passing animals in order to suck their blood and drop off when satisfied. The body of the female expands when full of blood, being to a certain degree elastic, while that of the male does not. The adult specimens are always furnished with eight legs, but

the young, which are six-legged, are frequently met with. Snakes are infested by a species of Ixodes called by Mr. Murray Ophiodes; but little seems to be known regarding the differences of the various species.

Before considering the Acari, we may notice two large and important divisions of the Ixodes, viz. :—

1. Trombidiidæ, or harvest-mites, which are subdivided into several families. It may suffice to mention the *Tetranychus autumnalis*, or harvest-bug,

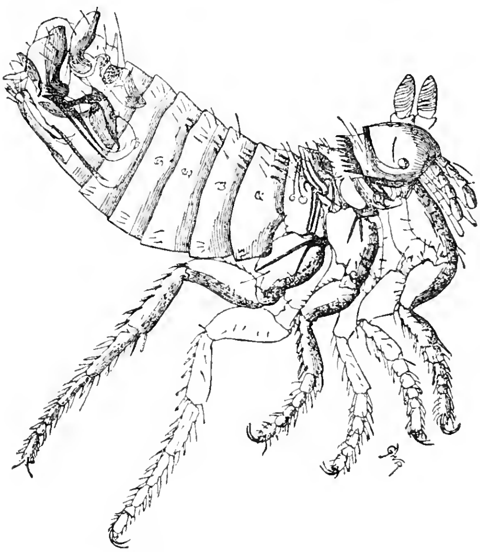


Fig. 88.—Flea of Birds, enlarged.

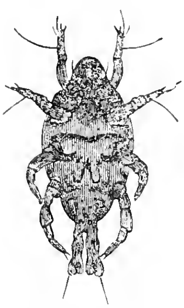


Fig. 90.—Listophorus of Hare. × 100.

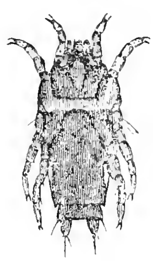


Fig. 91.—Dermaleichus of Chaffinch. × 100.

which is of a brick-red colour, and so minute as scarcely to be visible to the naked eye. They live among bushes and grass, and fix themselves to passers-by, causing much uneasiness and pain. Another well-known species of the Trombidiidæ is the *Scirus insectorum*, which is the small red parasite frequently found on the harvest spider and other insects.

2. Gamasidæ.—This is a large family, the greater number of which are parasitic. Perhaps the best-known species, and one showing the principal features of the family, is *Gamasus coleoptratorum*, found on the beetle, and also on the humble bee. Another well-known species is the *Dermanyssus avium*, which is common about the cages of canaries and other cage-birds; species very closely allied frequent swallows'-nests and also poultry-houses.

The Acari proper are divided into a large number of sub-genera, and are a subject of very great interest; but space will not permit my doing more than mentioning a few of the many interesting species which are found leading a parasitic life.

1. Hypoderidæ, found living between the skin and muscle of some birds, such as the pigeon. They are oblong, oval, and almost transparent.

2. Dermaleichidæ.—This sub-genus contains by far the largest number of species, almost every bird

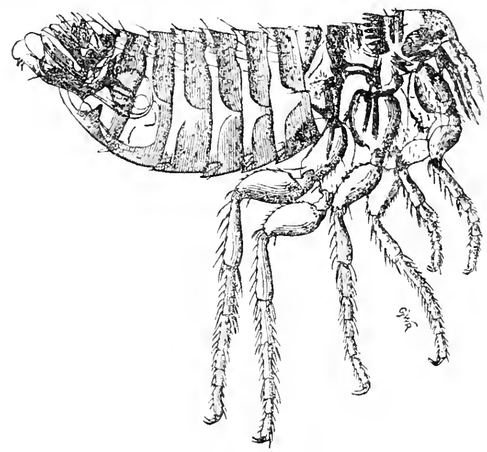


Fig. 89.—Flea of Squirrel (*Pulex sciurorum*), male, enlarged.

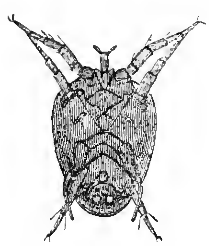


Fig. 92.—Hypopus of Fly. × 220.

Fig. 93.—Harvest-Bug (*Tetranychus autumnalis*). × 100.

having one peculiar to itself, and several being infested by two or three distinct varieties; in the latter case we find that each variety, as a rule, frequents a different part of the body, the primary feathers of the wing being a favourite resort, where, from their small size, these parasites look like fine dust. Figure 91 shows a typical example. In some species, such as one of the varieties found on the sparrow, the third pair of legs are very much enlarged in the males, but are of the normal size in the females. The body is covered by a chitinous skin, which is delicately striated.

3. Listophoridæ may be considered as the connecting link between the Dermaleichidæ and the Scaroptidæ. The commonest species, *L. gibbus*, is found on the hare and rabbit, often in large numbers. In connection with this parasite, though belonging to a different class, may be mentioned the *Cheyletus parasitivorax*, also found on the rabbit and hare, and whose vocation in life it is to live not upon the hare or rabbit, but upon the species of *L. gibbus* already mentioned, the hare or rabbit merely forming the happy hunting-ground.

4. Sarcoptidæ, or itch-mites, which are allied to the last sub-genera in many respects, but differ from them in their habits, and also in being injurious to their hosts. These mites, of which there are a number of varieties, all burrow below the skin and live, multiply, and die there. The common fowl is affected with one species; the mange of the horse is caused by a second; while the disease of sheep known as scab is occasioned by a third. All are of small size, and resemble in appearance the *Acarus scabiei*, specimens of which are to be found in most collections of microscope slides.

5. Hypopidæ.—There has been a good deal of controversy regarding this sub-genus, as to whether it is a distinct species or only the transition stage of some other Acarus; but into this discussion it will be unnecessary to enter. The two best-known species are *H. muscarum* (see Fig. 92), from the fly, and *H. arvicola*, from the field-mouse. In the above sketch many interesting species have had to be passed over, such as the genus Myobia, found on the mouse, and the Demodex, found in the pores of the skin.

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

A TORTOISE PARASITE. — Mr. Hyslop's "Chapters on Animal Parasites" reminds me of a curious creature I found adhering to the leg, or rather between the leg and abdomen, of a tortoise that had lived for some time in my garden. It was similar to a sheep-tick, but much larger—about the size of a shilling, but oval—with light fawn-coloured back and belly, and short dark legs. In shape and general appearance it curiously resembled its host, to the hard warty skin of which it was very firmly hooked, after the usual habit of these amiable creatures, whose beneficent agency is not satisfactorily defined in any of the Bridgewater Treatises. I make a note of finding this animal, as it strikingly illustrates the universality of such pests; a tortoise with its hard shell and small exposure of horny skin being apparently so well protected. Mr. Hyslop will probably tell us something about other similar creatures. It appears to me that the parasites of reptiles have been but little studied. Do the scales of a crocodile completely protect him from their attacks?

Saccharin.—Many paragraphs have lately appeared concerning this substance. In these it is described as something quite newly discovered. This is a mistake. It was discovered in 1879 by Fahlenberg and Remsen, who named it anhydro-orthosulphaminebenzoic acid, in accordance with the descriptive practice which I have already discussed in previous gossip. It was obtained by the oxidation of orthotoluenesulphonamide. Experiments have been recently made by Stutzer in order to ascertain whether its remarkable sweetening properties may become practically useful. He sweetened the food of rabbits and dogs with it, watched its effect on the animals, and observed nothing injurious. It passed through the bodies of these animals without change. It is so intensely sweet that one part dissolved in 10,000 parts of water perceptibly sweetens it. It has in addition a slight almond flavour. Stutzer concludes that it will in future be used instead of cane sugar for sweetening pastry, liqueurs, medicines, etc.

I am very sceptical concerning the desirability of using it for sweetening any kind of food. The dogs and rabbits were not killed, but, being unable to answer questions concerning the state of their health and feelings, their evidence is of little value. The introduction of a foreign substance which passes through the body without being assimilated or otherwise changed may not produce violent mischief, but it must act somehow if it has any decided chemical energies; and any interference with the normal healthy actions of the bodily functions is likely to be damaging rather than beneficial. The most plausible excuse for using this substance is for sweetening the food of diabetic, gouty and other patients, who may be injured by using sugar. There is however a much safer mode of overcoming this difficulty—that of resisting the childish craving for sweeties and sweetening, which is easily done by simple abstinence. I have met with several cases of men who have thus abstained; all have found, after a while, that their desire for sugar was an acquired habit, and that finally they preferred their tea, coffee, etc., without sugar.

The name of saccharin, as now applied to this substance, is unfortunate, this name having been applied in 1880 to the carbohydrate obtained by the action of lime on common cane sugar.

Poisonous Cheese.—In 1883–4 as many as three hundred persons were taken ill in Michigan after eating certain cheeses; the symptoms were vomiting and purging, followed by signs of failure of the heart, and nervous prostration. The cheeses had no special or peculiar flavour, but when cut a slightly opalescent acid fluid exuded. Dogs and cats refused to eat

them. Microscopic examination revealed numerous micrococci. These were cultivated and injected into rabbits with negative results, but an acid watery extract was obtained from the cheese, and from this a precipitate that was soluble in ether. This solution on evaporation gave crystals which were found, when taken by men, to produce the symptoms above described. It was therefore the poison, and has received the name of tyrotoxicean. The "Journal of the Chemical Society" of April last, from which I obtain these particulars, says nothing about the origin of the cheeses. The locality suggests a suspicion. American ingenuity has devised a method of obtaining both butter and rich fat cheese from the same milk plus a cheap ingredient. The cream is taken from the milk, and the curd precipitated from the skimmed milk. Ordinary skim-milk cheese is very hard, dry and unsaleable; but these defects have been remedied by intimately mixing with the curd an amount of hog's lard sufficient to represent the abstracted butter. Query: Were these poisonous cheeses samples of this peculiar mode of manufacture?

The Evolution of Grasses.—A very interesting paper was read at the Geologists' Association by J. Starkie Gardner on this subject. The present preponderance of grasses over all other forms of vegetation is very remarkable. There are over 3000 species, estimated to occupy, under cultivation, one third of Europe. Into this country alone their products are imported to the value of nearly one hundred millions sterling. About 95 per cent. of the plants growing in ordinary meadow land are grasses. Mr. Gardner concludes that there was no great development of grasses until towards the close of the Eocene, no definite remains having been found associated with the older Eocene floras of temperate latitudes, as they should be had they then existed in any abundance. The later deposits, such as the Miocene beds throughout Europe, are crowded with them. In further support of this conclusion, it was shown that the teeth of all the early Eocene herbivorous Mammalia were adapted for crunching fruits, snapping twigs, and grubbing up roots, rather than browsing on such food as grass. The geological history of insects was also put in evidence to support the theory of the post mid-Eocene date of grass. The remains of grass in the Tertiary deposits of Spitzbergen may be older, but their age has not yet been accurately correlated. These conclusions, if confirmed, indicate a very distinctly marked epoch in the evolution of both vegetable and animal life, as the introduction of such an aggressive type must have altered the character of both flora and fauna of the Temperate Zones to an extent quite equal to that which the other geologists attributed to violent catastrophes.

Magic Mirrors.—Professors W. E. Ayrton and John Perry have accidentally discovered that the amalgamation of metals is accompanied with great expansive force. If one side of a thick straight brass bar be amalgamated, this side becomes convex, and the opposite side concave. They suppose that the Japanese magic mirrors which have excited so much controversy may be explained by an action of this kind. These mirrors are made of bronze, are polished on one side, and have raised figures on the other, the polished reflecting surface appearing perfectly smooth and regular, without any trace or indication of the figures, yet when light is reflected from this surface and thrown upon a screen the luminous image of the mirror displays the figures that stand out on the back. In a paper read some time ago before the Royal Society, Messrs. Ayrton and Perry have already shown that this magic result is due to the polished side opposite to the thinner parts of the casting being more convex than that opposite to the raised parts, a conclusion they have verified by showing the reversal of the pattern when formed by a convergent beam of light. This would be the condition of such a casting if the whole of the reflecting surface were subject to an uniform expansive stress, as the thinner or weaker parts would thereby become less concave or more convex than the thicker parts. The authors now suppose that, instead of this irregularity being produced intentionally in the course of manufacture, it may have arisen accidentally from the use of a mercury amalgam in the polishing of the reflecting surface of the mirror.

Arctic Ground Ice.—"The Popular Science Monthly" states some facts indicating that the depth of frozen soil in Arctic America is much greater than is usually supposed. In 1883 Lieutenant P. H. Ray, U.S.A., sank a pit near Point Barrow to a depth of 38 feet. At 28 feet from the surface the temperature of the soil was 12° Fahr., and the same at 38 feet. Taking the unit of increase of temperature per unit of depth as 1° Fahr. to 64 feet, he computed the total thickness of ice at about 1300 feet. The depth to which the summer thaw extends, and its rate of progress, are more variable, as they depend more on the season and exposure than does the depth of frozen soil. In some respects the frozen substratum may be advantageous, as it moderates the effect of the scorching heat of continuous Arctic sunshine, and supplies moisture to the roots of cereals when they most require it. This is so much the case that General Lefroy, who has studied the subject in Siberia, believes that agricultural experience in the north-west would be in favour of retaining the frozen ice even if it were possible to get rid of it.

Arctic Summers.—There are few subjects concerning which popular delusions are more generally diffused than that of Arctic climate. The very name of "the Arctic Regions" is so firmly associated in our minds with ice and snow, polar bears, and

freezing mercury, that the idea of oppressively hot weather within the Arctic Circle appears a ridiculous paradox. Nevertheless such weather is experienced in these latitudes whenever the sky is free from clouds, and nowhere within the tropics are mosquitoes so intolerably abundant and active as on the island of Magerö, whose culminating cliff forms the North Cape. One of my travelling companions in this region, a sturdy German Uhlan officer, who had ridden safely through the thickest dangers of the Franco-German war, was vanquished and unhorsed in the course of his struggles with the clouds of mosquitoes that blinded and choked him as he rode from the landing-place of Kjelvig to the top of the Cape. Describing his battle with them, he said: "I did breeve mosquitoes, I did spit zem out of my mous." I never suffered more from oppressive heat than in the course of a walk up the Tromsdal, to visit the Laplanders that are there encamped.

It should, however, be understood that special conditions are necessary in order to experience fully the torrid effect of Arctic sunshine. On a second visit to the Lapps in the Tromsdal at about the same time of year I found the weather quite chilly, but this time it was during a cloudy, drizzling summer. On the first occasion the sun had been shining continually all day and all night long for several weeks through a bright blue sky, free from even a fleck of cloud. Besides this, one must be clear of glaciers to experience such summer weather. Smith's Sound, the usual track of our Arctic explorers, is a great fjord, the outlet of a multitude of glaciers which the utmost energies of the continuous summer sunshine fail to melt.

I have described this subject more fully in a paper on "Aerial Exploration of the Arctic Regions," (see "Science in Short Chapters") and have no doubt that if the conditions of surface are favourable—that is if there is an absence of glacier-forming mountains and valleys—the North Pole and its immediate surroundings is a region of very hot summer-time, and possibly of rich summer vegetation, similar to that of the plains of Arctic Siberia, which are so luxuriant in summer and so horrible in winter.

Low Ceilings.—To advocate these as advantageous from a sanitary point of view, and more especially in reference to ventilation, appears very bold indeed. Nevertheless this is done in "The Popular Science Monthly" of April. In such rooms, it is argued, the window tops being nearer the ceiling, there is a better sweeping-out and changing of the general atmosphere of the room, whereas, if the ceiling is higher, only the lower part of the air is moved, and an inverted lake of foul and hot air is left floating in the space above the window-tops. It is further argued that the stagnant atmospheric lake under the ceiling, although motionless, keeps actively at work, under the law of the diffusion of gases, fouling the fresh currents circulating beneath it. With low ceilings and high windows such accumulation of foul air is not possible, the whole height of the room being swept by the currents as the dust of the floor is swept by a broom. Low ceilings enable a room to be warmed with less expenditure of heat and less cost of fuel.

I may add to this that such a room, with a window reaching to within a few inches of the ceiling, may be safely warmed by a gas or paraffin stove without any chimney, especially if the window is opened above to the extent of about one-eighth or one-quarter of an inch. In this case the room is warmed chiefly by a mild and well-diffused radiation from the ceiling, which under such conditions will be the warmest part of the room.

FERTILISATION OF *ANTIRRHINUM MAJUS*.

WHILE walking round the garden on June 30th, my attention was drawn towards a humble-bee, which had alighted on the flowers of *Antirrhinum majus*. Being interested in the subject of the fertilisation of flowers, I watched the action of the bee for some time. Instead of trying to force its way into the throat of the flower, it applied itself in each case to the saccate base of the corolla, and made a small puncture, as bees have been observed to do in the case of *Erica cinerea*, and *E. tetralix*. The honey was obtained by this means, without any part of the insect coming in contact with the essential organs of the flower. All the plants in the garden have been visited in this way, and in many cases, the large buds have been pierced before they have expanded into flowers.

This appears worthy of notice, and if any readers of Science-Gossip should make similar observations, I should be glad to receive their confirmation.

Müller, in his work on "The Fertilisation of Flowers," makes no mention of this method of approaching the antirrhinum, but, after drawing particular attention to the closed entrance which excludes the smaller bees, he goes on to say, 'This shows clearly how far the fast closure of the mouth is useful to the plant; if the small bees could enter from the first, they would use up much of the honey, and the flowers would be less diligently visited by the humble bees."

I have marked some of the buds which have already been pierced, and intend to keep a record of the number of capsules which ripen in these marked cases, taking care that no bees visit the marked buds in the legitimate way, after they have expanded. It does not appear likely that many will make the attempt after finding that the honey has been already taken.

Dr. Ogle found that antirrhinum produced no seeds when protected from insects by a tent of wire gauze.

A most interesting question arises from these observations: are the bees increasing in intelligence, and, having found that the method of puncturing answers so well in the case of the heaths, are they applying it to other flowers, which are somewhat difficult of access?

ROBERT PAULSON.

ASTRONOMY AND METEOROLOGY.

By JOHN BROWNING, F.R.A.S.

AT the meeting of the Royal Astronomical Society on the 9th of April, an old legal document bearing the signature of Mr. Chester Moor Hall, who was the inventor of the achromatic telescope a quarter of a century before Dollond, was presented to the Society by Mr. R. B. Prosser, of the Patent Office. The council ordered this document to be framed and suspended in the council-room.

The remarkable new star which burst out about the 17th of August last in the nebula of Andromeda was observed at the Radcliffe Observatory, Oxford, up to the 10th of December, when it had become reduced to a 14th magnitude, and was only just discernible with an object glass of seven inches aperture. Professor Asaph Hall, of Washington, observed this star with a twenty-six inch object glass until February 7. It was then barely visible with that gigantic instrument, and did not exceed a 16th magnitude. Mr. Monck, of Ireland, assumes that this star is one of the swiftly moving ones that in rushing through the nebula had been set on fire. Mr. Monck's theory is that, "as shooting stars are known to be dark bodies rendered luminous for a short time by rushing through our atmosphere, new stars are dark or faintly luminous bodies which acquire a short-lived brilliancy by rushing through some of the gaseous masses which exist in space."

Mr. Brooks, of Red House Observatory, Phelps, New York, discovered another comet, stated to be bright on the evening of the 30th of April. It was then almost exactly midway between α and β Pegasi, moving slowly in a northerly direction towards the latter star.

Mercury will be at the least distance from the sun on the 24th of June at 8 A.M. Venus will be at the least distance from the sun on the 26th of June at 8 P.M.

There will be no occultation of any star above the fifth magnitude.

The sun will enter Cancer, and summer will commence on June 21st at 7 A.M.

In June there is no real night, but always either daylight or twilight.

Mercury will be a morning star until the 24th of June. Venus will be an evening star.

Mars will be a morning star during the whole month. Jupiter will be an evening star throughout the month.

Saturn will be too near the sun for observation.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
MERCURY ☿	4	3 20M	11 19M	7 18A
	11	3 35M	11 16M	8 17A
	18	4 5M	0 35A	9 5A
	25	4 47M	1 9A	9 31A
VENUS ♀	4	2 13M	9 7M	4 1A
	11	2 2M	9 9M	4 16A
	18	1 52M	9 13M	4 34A
	25	1 43M	9 17M	4 51A
MARS ♂	4	11 50M	6 23A	0 58M
	11	11 39M	6 0A	0 35M
	18	11 30M	5 50A	0 12M
	25	11 23M	5 35A	11 47A
JUPITER ♃	4	0 38A	6 56A	1 18M
	11	0 13A	6 30A	0 50M
	18	11 48M	6 4A	0 24M
	25	11 23M	5 38A	11 53A
SATURN ♄	4	5 32M	1 44A	9 56A
	11	5 8M	1 20A	9 32A
	18	4 45M	0 57A	9 9A
	25	4 22M	0 35A	8 44A

Meteorology.—The mean temperature for the week ending the 17th of April was 43° 7′, which was 3° 6 below the average. Rain fell on four days to the aggregate amount of 0·10 of an inch. The mean temperature of the week ending the 24th of April was 48° 1′, which corresponded with the average. Rain fell on one day, the 19th, to the amount of 0·09 of an inch. The mean temperature of the week ending the 2nd of May was 47° 7′, which was about 1° below the average. Rain fell on two days of the week to the aggregate amount of 0·36 of an inch. The mean temperature for the week ending the 8th of May was 55° 2′, which was 5° 5′ above the average. The week was rainless, as only 0·55 of an inch (about 60 tons to the acre) of rain fell during the month ending May 8th; for the neighbourhood of London the rainfall was but little more than half the average.

The average mean temperature for June is 60° Fahr. from the Midlands to near the south coast. The influence of the sea reduces the temperature about one degree just along the coast.

The average rainfall for June is 2 inches.

No fewer than twelve genera of fossil Reptiles have recently been described by M. Gaudry, from the Permian formation of Bohemia. They are all of small size and inferior development, as compared with the Reptiles of the Secondary period.

SCIENCE DIRECTORY.

ALBANY *Naturalists' Club, Edinburgh.* Hon. President, Rev. J. Pulsford, D.D.; Presidents, Rev. A. B. Morris and W. E. Hoyle, M.A., F.R.S.E., M.R.C.S.; Secretary, P. Caradoc Williams, F.I.C.

Clydesdale Naturalists' Society. President, T. J. Henderson, 24 Florence Place, Hillhead; Vice-Presidents, E. C. Eggleton, R. Christie, John M. Campbell; Hon. Secretary, John Mackay, 78 Gloucester Street, Kingston, Glasgow.

Great Eastern Railway Mechanics' Institution, Natural History and Microscopical Section. President, Mr. Thomas Rea; Hon. Secretaries, Mr. Claud S. Scott and Mr. D. O. Ewing. The meetings are held at G. E. R. Mechanics' Institution at Stratford, Essex. The "Section" has been in existence one year, and numbers about fifty members; started to encourage the study of natural history and microscopy amongst the men employed on the Great Eastern Railway.

Guernsey Society of Natural Science. President, T. Guille, Esq., Montauban; Hon. Secretary, Wm. Sharp, Granville House, Mt. Durand.

Hackney Microscopical and Natural History Society (The Morley Hall, Hackney). President, Dr. M. C. Cooke, M.A., LL.D., F.L.S., 146 Junction Road, Upper Holloway. Hon. Curators, F. Coles, F.L.S., C.F. Holland, F.R.M.S.; Hon. Librarian, R. Paulson; Hon. Secretary, Collis Willmott, F.R.M.S., Triangle, Hackney.

Hampshire Field Club. (Established 1885, for the study of the Natural History and Antiquities of the County.) President, Professor F. S. B. F. de Chaumont, M.D., F.R.S.; Hon. Treasurer, W. E. Darwin, J. P., B.A., F.G.S.; Hon. Secretaries, Morris Miles, 44 Carlton Road, Southampton, T. W. Shore, F.G.S., F.C.S., Hartley Institution, Southampton; Hon. Local Secretaries: Alton—Rev. J. Vaughan, M.A.; Andover — Rev. H. R. Clutterbuck, A.K.C.L.; Bournemouth—R. G. Pinder, M.R.I.B.A.; Fordingbridge—E. Westlake, F.G.S.; Winchester, C. R. Pink, M.R.I.B.A.

Lincoln Science Club. President, the Rev. W. W. Fowler, M.A., F.L.S., etc. The School-house. Vice-President, Mr. W. J. Gant, M.R.C.S., etc.: Hon. Secretary. the Rev. W. W. Fowler. Members meet at each other's residences once a month.

Liverpool Science Students' Association. President, Mr. William Narramore; Vice-Presidents, Mr. Henry Ashton Hill, Mr. Osmund W. Jeffs; Hon. Secretary, Mr. W. H. Read, 24 Fern Grove, Lodge Lane, Liverpool; Hon. Treasurer, Mr. John Edwards; Hon. Librarian, Mr. E. O. Windle; Botanical Referee, Mr. H. Leaton Edwards.

Royal Historical Society. President, the Lord Aberdare, G.C.B., F.R.S.; Librarian, W. E. Poole, 11 Chandos Street, Cavendish Square, W.; Secretary, P. Edward Dove, F.R.A.S., 23 Old Buildings, Lincoln's Inn, W.C. *Cambridge Branch*—Professor J. R. Seeley, M.A. (Caius), Chairman; J. R. Tanner, B.A. (St. John's), Hon. Secretary.

School of Pharmacy Students' Association. President, Professor Attfield, F.R.S.; Hon. Secretary and Treasurer, Mr. F. W. Short, 17, Bloomsbury Square, London, W.C.

Society of Amateur Geologists, 31 King William Street, London, E.C. President, A. C. Maybury, D.Sc., F.G.S.; Secretary, G. F. Harris, F.G.S., 49 Gloucester Street, Belgrave Road, S.W.

SCIENCE-GOSSIP.

MR. E. F. IM THURN recently read a paper at the Linnean Society on the plants found by him during his ascent of the singular mountain, Roraima, British Guiana. Among them are three new genera and fifty-four new species. The mountain appears to have been a centre of distribution.

THE meeting of the British Association for 1887 will be held in Manchester, and it is expected that Professor Sir Henry Roscoe will be President.

A LONG and animated discussion took place at the recent meeting of the Entomological Society, on the proposal to transpose many of the most familiar generic names. The project was almost unanimously condemned.

APROPOS of "Primrose Day," a correspondent expresses his opinion that Conservatives would act better up to their political creed by planting primroses on that day, rather than gathering them by tons, and thus helping to destroy the prettiest and most characteristic of our English wild-flowers!

WE are pleased to notice that Liverpool is about to do honour to one of its most distinguished and useful citizens—a man who has spent his life in the cause of scientific education. A subscription has been opened to present the Rev. H. H. Higgins with a testimonial in recognition of his scientific services.

DR. RICHARDSON'S "Asclepiad" for the current quarter is well worth buying, if only for the sake of the article on "The Poverty of Wealth."

MR. JOSIAH ROSE has written a charming little brochure entitled "Notes on Fairs." It is printed in blue ink on green English paper, as an optical experiment, and there can be no doubt as to the greater comfort of reading print under these circumstances.

The lengthy Report of the British Association Committee (edited by Mr. William Topley, F.G.S.) on the "Erosion of the Sea-coasts of England and Wales," has been published. It also contains a full chronological list of books and papers on the subject, compiled by Mr. William Whitaker, F.G.S.

An extra number of the "Amateur Photographer" has appeared, entitled "Home Portraiture International Competition for 1886," and containing a series of capitally executed facsimiles of photographs taken by amateur photographers, with descriptive letterpress.

We are pleased to see that Mr. H. W. S. Worsley-Benison's presidential address, delivered before the Highbury Microscopical and Scientific Society, on "Charles Darwin," has been reprinted from the "Journal of Microscopy," etc. It is an admirable, loving, and reverent study of a great man's life and works, untainted by the slightest breath of fetishism.

Mr. A. A. Wood, F.C.S., has published a very useful little pamphlet, entitled "A Photograph, and How to Take It," which must be of great use to beginners.

The event of the month has been the opening of the Colonial and Indian Exhibition at South Kensington. The naturalist and geologist will there find an excellent and various exhibition of animals, plants, minerals, etc., characteristic of the different colonies. Those from Australia are particularly interesting.

In last month's "Entomologist" there is a figure of an unknown African lepidopterous hairy caterpillar nearly six inches long! A few of these would not make bad crossing-sweepers.

At a recent meeting of the Hertfordshire Natural History Society, a most elaborate paper was read by Mr. William Ransom, F.L.S., entitled "An account of British and Roman remains found in the neighbourhood of Hitchin." Mr. Ransom has been successful in discovering an enormous and varied number of remains.

Under the title of "Lecture-Notes and Problems on Sound, Light, and Heat," Mr. Charles Bird, B.A., has issued a very useful and compendious note-book, which will prove of much service to teachers as well as students.

In last month's number of the "Annals and Magazine of Natural History" there is an account of a Brazilian frog which does not deposit its eggs in water, but in the leaves of willow-trees, each leaf being then bent over so as to form a closed basket.

We have received from Messrs. Dulau, 37 Soho Square, W., their recently issued and very useful catalogue of geological, palæontological, and mineralogical works.

Science in Lincoln is making strong way. During the summer the new Schools of Science and Art will be opened. They have been built at a cost of £7000.

The eighth edition of "The London Catalogue of British Plants" has just been published by Messrs. G. Bell & Sons, 4 York Street, Covent Garden.

All entomologists who have the chance should read the annual address of Dr. C. V. Riley, delivered before the Entomological Society of Washington, and recently reprinted by Messrs. Gibson Bros., of that city.

Entomologists will be glad to learn that the Rev. W. W. Fowler has placed in the hands of his publishers (L. Reeve & Co.) the first portion of the MS. of his new work on the British Coleoptera. A large-paper edition with coloured plates is also proposed, if adequate support can be obtained to justify the large outlay that must necessarily be incurred for artistic work.

MICROSCOPY.

New Slides.—We have received an admirably mounted and most instructive slide from Mr. E. Hinton, 12 Vorley Road, Upper Holloway, showing vertical section of an entire fœtal mouse, in which are all the principal organs and structures, eye, ear, brain, vertebræ, heart, lungs, kidney, spleen, intestines, etc. It is impossible for a young biologist to work at a more profitable slide. Mr. J. Harbord Lewis, of 145 Windsor Street, Liverpool, has also sent us three of his fine Desmid mounts, with list of species accompanying each slide. The richest slide is from Capel Curig, and contains no fewer than sixty-eight species alone. This is by far the best and easiest way of studying the Desmids, especially if the student have the means of referring to Dr. Cooke's or Ralfs' works.

Cole's "Studies in Microscopical Science."—The fourth volume of this deservedly widely known and most useful work is now commencing. It will be divided into four sections as usual, viz.: Animal and Botanical Histology, Pathological Histology, and Popular Studies, all or any of which can be separately subscribed for. No literary caterer for microscopical students better deserves success than Mr. Cole.

Mr. Cole's New Slides.—We have received three slides from Mr. A. Cole which deserve more than passing notice. They are mounts of diatoms in cassia oil alone, and are remarkable for the sharpness and clear definition with which every line and dot on the frustules stands out. The objects include *Heliopelta*, *Naviculæ* from Japan, Triceratium. These slides establish the superiority of cassia oil as a medium beyond doubt.

"JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY."—The April part contains, besides the usual admirable summary of current researches in every department of zoology, botany, &c., the full address of the President (Dr. Dallinger), whose partial publication in the "Times" and other London newspapers, immediately after being delivered, excited much attention. This address is illustrated by plates of all the micro-organisms referred to, and also by an admirable portrait of Dr. Dallinger himself.

MOUNTING IN BALSAM.—The query by Alfred Pinnock (p. 113) is easily answered. From the description of his method of working, it would appear that when his object is fairly in the balsam, and the cover-glass on, he puts a clip which presses out all the balsam except a small portion, sufficient to fill the space around the object between the cover-glass and slide. The balsam pressed out soon begins to harden, and this naturally prevents the evaporation of the liquid or spirituous portion of the balsam, contained under the cover-glass; but as soon as he has removed this the evaporation goes on more readily and rapidly of the balsam included with the object; this naturally lessens its bulk; and, as his clip has pressed the two glasses as close together as the object will allow, it naturally follows that less bulk requires less space, and that gives room for the admission of air. The cure will be to refrain from putting so much pressure on the cover-glass, and the exercise of a little more patience for the hardening process to be completed. —*C. Croydon.*

GUM-TRAGACANTH FOR INSECT MOUNTING.— Is there any, and if any what, method of keeping gum-tragacanth good, free from mould, and ready for use, for any length of time? When simply soaked with water it usually gets mouldy in a few days.—*V.*

ZOOLOGY.

THE DISTRIBUTION OF MOLLUSCA IN THE LAKE OF GENEVA.—A large species of Anodonta, common in the lake, appears to obtain the assistance of small fish in order to convey the "spat" to new grounds in the following manner. When the tiny fish is at hand, the germ of the mollusk is deposited actually on the back of the fish in some manner; it is thus distributed in fresh parts of the lake, evidently becoming detached from the convenient locomotive. I do not know if the fact is new to students of biology. It was pointed out to the writer by the curator of a Swiss museum. In a fresh-water aquarium the Anodonta flourished vigorously; in the same tank the immature fish were darting about from weed to weed, having bright silvery spots attached to the back, somewhat like air-bubbles. These minute points, the curator informed me, develop into tiny mollusks, and are suddenly thrown off the fish to the gravelly bottom.—*F. G. S.*

"THE ROTIFERA, OR WHEEL-ANIMALCULES." —We have received the third part of this splendid and useful monograph, in which the Melicertiadæ are continued, every genus and species being fully described and figured. Chapter vii. is devoted to the order Bdelloida, which includes the Philodinadæ and Adinetadæ. Chapter viii. deals with the order Ploïma, containing the families Microcodidæ, Asplanchnadæ, and Synchætadæ. This third part concludes the first volume of the work, for which Dr. Hudson has written the Preface. It contains fifteen plates, all in the highest style of art.

TENGMALM'S OWL.— A specimen of this rare pigmy was killed in East Aberdeenshire a short time ago. It was a female in good order (and is now preserved), but weighed only 3¾ ounces.—*W. Sim, Fyvie.*

PROVINCIAL AND OTHER SOCIETIES.—The number of "Proceedings," "Transactions," &c., we are constantly receiving from all parts of the British dominions plainly indicate the widespread and rapid progress of scientific study and inquiry. The "Proceedings of the Royal Society of Tasmania" for 1885 are especially rich in papers relating to the geology, botany, and zoology of the island. Mr. R. M. Johnston is a large contributor to the geology, Mr. Baston to the botany, the Hon. W. Macleay to the zoology. The present volume also contains a sketch-map of the general geology of Tasmania, by Messrs. C. P. Sprent and R. M. Johnston. We have also received the "Transactions of the Hertfordshire Natural History Society" for February and March, 1886, containing title page, etc., list of members, proceedings for last year, report of the council, etc. The sixteenth Annual Report of the Wellington College Natural Science Society for 1885 contains accounts of the excursions, together with entomological, meteorological, and phenological reports. It also gives capital digests of the lectures delivered before the members of the society.

CHAMELEONIC ARIONS.—Mr. Roberts's note on page 118 deals with some extremely interesting phenomena which have hitherto received but scant attention. It is well known that the slugs have the power of throwing out quantities of slime, which covers their bodies, and experiment will readily show that in some instances, when the slime is coloured, they can by this means change their apparent colour from grey to yellowish, or, as in the case of the small *A. ater* found by Mr. Roberts, from white to pale greenish. Mr. Roberts has sent me some of his orange-yellow *Arion hortensis*, and it is perfectly clear they derive their orange tint solely from the colour of their slime, and if this is wiped off they

appear grey with black bands. This slime-coloured variety of *A. hortensis* is far from rare; I have seen specimens from Clonmel, Ireland (A. H. Delap); Louth, Lincs. (H. Wallis, Kew); Truro, Cornwall (J. H. James); and Headley Lane, near Boxhill, Surrey. I may mention here that Mr. Delap has sent me, from near Clonmel, two examples of *Limax arborum* var. *maculata*, of which only one example was hitherto known (from Mayo). The form is so distinct from typical *arborum* that I doubt whethe they ought not to be specifically separated.—*T. D. A. Cockerell, Bedford Park, Chiswick.*

BOTANY.

Peloric Orchids.—In reply to the remark of M. John Rasor in Science-Gossip, 1885, p. 184, I may state that the peloric form of Orchis is not so uncommon a teratological example as he seems to think. In his "Flore Française," published in 1836, Mutel enumerates the peloric form of *O. bifolia*, *O. laxiflora*, *O. morio*, *O. latifolia* (t. iii. pp. 232–242). In his recent "Flore de la Côte d'Or," 1883, p. 498, Royer notes a curious sort of peloria with diminution of the number of the organs. He describes an *O. maculata*, the perianth of which had but four pieces, viz. two internal and two external, and two stamens with bilobate anthers, and which bore neither lip nor spur. Is anything of that sort mentioned in the "Vegetable Teratology" by Maxwell T. Masters, London, 1869? I have not that work at my disposal.—*C. Copineau, Doullens (Somme).*

The Watson Botanical Exchange Club.—We have received the Second Annual Report of this Club, of which Mr. A. R. Waller, Low Ousegate, York, is the Hon. Sec. The number of plants received for distribution by means of its exchanges was 4,754, from 28 members. The report gives many new records of plants from various localities in the kingdom.

Abnormal monœcious condition of Empetrum nigrum, or Crowberry.—In my botanical rambles one morning last month among the heather, I picked up specimens of *Empetrum nigrum* in fine flower, and on examining them at home I found on a branch of one of the stemmate plants a good-sized berry of last year just immediately below a good cluster of flowers in full bloom. Has this ever been observed before?—*Thomas Fisher.*

Iceland is a favourite country with naturalists. Mr. Arthur Bennett, F.L.S., has published a paper entitled "Recent Additions to the Flora of Iceland" in the "Journal of Botany."

Swans.—A flock of twenty-one passed here on the 18th of April, probably migrating to their breeding haunts in the far north; such a flight is rarely seen in this inland district.—*W. Sim, Fyvie.*

GEOLOGY, &c.

"British Petrography."—The fourth part of this work, by Mr. J. J. Harris Teall, F.G.S., is published, continuing the microscopic structures of the igneous rocks. Mr. Teall groups the porphyritic rock into seven groups, according to the modifications of the ground mass. The coloured plates are very beautiful and of high artistic and careful finish. They portray the microscopic structure and appearance of hornblendic diabase, junction of troktolite and serpentine, augite-picrite (four figs.), and hornblende-picrite.

The Sedgwick Prize (in honour of the late Professor Sedgwick), which is given triennially for the best essay by a graduate of the University of Cambridge, on a selected subject connected with geology, has this year been awarded to Mr. Thomas Roberts, B.A., F.G.S., of St. John's College and the Woodwardian Museum. The value of the prize is about £70. The essay is on "The Jurassic Rocks of the Neighbourhood of Cambridge," and will shortly be published, forming no doubt a valuable contribution to local geology.

At a recent meeting of the Ipswich Scientific Society, Dr. J. E. Taylor gave an account of a large collection of animal remains he had obtained since Christmas from the low-level valley gravels close to the town, which have been lately opened for road materials. They included bones of rhinoceros, elephant, ox, deer, etc., together with numerous teeth of horse, ox, etc., nine molars of rhinoceros, and seven ditto of the mammoth.

Mr. T. M. Reade, F.G.S., has a work in the press which will be of great interest to geologists, entitled "The Origin of Mountain Ranges, considered Experimentally, Structurally, Dynamically, and in relation to their Geological History."

NOTES AND QUERIES.

Aurora Borealis.—On March 30 the northern lights were very vivid; they are called "streamers" in this part of the country. It was remarked by several persons how close they were to the earth, seemingly not more than 100 to 150 yards distant. It is stated that the first time they appeared in Britain was about the time Sir W. Raleigh was beheaded.—*S. A. B., Cushendun.*

"Query for Teetotallers."—I think the explanation of the phenomena alluded to by "W. H." in "A Query for Teetotallers" is to be found in the difference of composition between the spirits in question. Whisky is a spirit containing no sugar, while genuine brandy contains it in an appreciable quantity, and "doctored" brandies to a much larger extent. It is owing to the presence of this substance in brandy that the frothiness, when mixed with seltzer or soda-

water, is due, the presence of sugar in aerated waters accelerating the escape of the carbonic acid gas with which they are charged.—*E. F. Salmon.*

SINGULAR METEOROLOGICAL PHENOMENA.—On Thursday last, and also on Saturday, we had a hailstorm and a snowstorm within a quarter of an hour. My son asked how it was that such phenomena occurred; what were the distinct and different conditions of the atmosphere to produce them? I could not explain, and therefore I venture to ask you. He also asked me to explain the difference of hail and snow as frozen rain. Will you kindly give a slight explanation in your next number? My sight is bad, so pray excuse pot-hooks.—*R. F. Z., Milford, Salisbury.*

STARLINGS.—I think the following may serve in some degree to explain S. H. Davey's query. About five miles west of Ponsnook are the extensive woods of Teleidy, which abound in pines, firs, and thick underwood, and are the usual roosting-place in winter of the vast flocks of starlings which leave south-west Cornwall in summer, or disperse to their various nesting-places in the north of the county. Starlings do not seem to have begun to breed to any extent in Cornwall south of Truro, where a few nested about nine years ago. Until about fifteen years ago not a single pair, I think, were known to nest in the county. I have often observed the enormous flocks of birds passing over Redruth, half-way between Ponsnook and Teleidy, morning and evening, and noticed the different heights of flight. The only explanation I can offer is that in the early morning the birds are fresh and active, and thus able to follow the line of the country, so as to pick out suitable feeding grounds; but when tired, after their day's flight, they rise in the first instance to a great height, and then do the five miles homewards on a gentle incline, which tactic causes them much less exertion than if they rose gradually with the rising ground they have to pass *en route*. I have many times seen whole flocks pass over Redruth to the westward, with wings quite motionless.—*Chas. J. Jenkin.*

POISONOUS CHARACTER OF THE YEW.—There seems no doubt that the eating of the leaves of the yew-tree is frequently fatal to cattle. I sent you the narrative of a lady who actually witnessed the death of a donkey from the same cause. Gilbert White, in his "Natural History of Selborne," chap. v., says that milch cows died even from eating yew-berries. But I think this must be a mistake. The so-called "berry" of the yew is perfectly harmless, though the seed within the enlarged fleshy calyx is slightly acrid or bitter. The only conifer that I know of that is deleterious is the savin, which has rather strong medicinal properties. But what peculiar property there is in the young shoots and leaves of the yew to cause death to cattle "in a few minutes" (these are the words of Gilbert White, and they are borne out by the narrative enclosed), I am unable to conjecture. I used to think the cause of death might be attributed to the tough and leathery nature of the leaflets, which animals would possibly be unable to digest. But if this were the cause, such a speedy death would not ensue. The subject is most perplexing. I have macerated some yew-leaves in boiling water, and tasted the liquor, but there is nothing in it to suggest the idea of poison. Gilbert White adds: "Even the clippings of a yew hedge have destroyed a whole dairy of cows when thrown inadvertently into a yard, and yet sheep and turkeys, and, as park-keepers say, deer, will crop these trees with impunity."—*F. A. Paley, LL.D.*

VENTRICULITES IN THE DRIFT GRAVELS.—Any reader of SCIENCE-GOSSIP having any information on this subject, I should be very pleased to have it.—*F. Challis.*

TAME ELEPHANTS BREEDING.—The following is an extract from a reputed letter of Mr. P. T. Barnum to a friend in London: "As we have had good luck in breeding elephants, having three baby elephants of American birth now on hand, besides a couple of young Jumbos on the stocks, due in four and seven months, I hope for the same good fortune with Widow Alice." I should be glad to see some opinions on the above, as it is generally stated that the domesticated female elephant will breed with the wild male only.—*W. A. Gain.*

OUR ROBINS.—At a country house not far from London, a robin has since last November been in the habit of going to breakfast every morning with the family. It comes in at any window, and will walk about the table, pick up crumbs, and even take small pieces from the finger and tongue of those at breakfast. Now that the severe weather is over, it still goes, and is now paying for its window feeding by charming little bursts of song.—*L. W. W. P.*

MASON-WASPS.—The insect mentioned in last month's SCIENCE-GOSSIP by Rev. S. A. Brenan belongs to the genus Odynerus, generally known as the mason-wasps. These insects are generally seen in pairs; the female it is, however, who constructs the nest. This is done by burrowing, or more properly speaking excavating, in the warm and sunny sand-banks, the dry grains of sand being removed by the labour of the insect, and carried to a distance from the excavation. The insect forms a sort of basket with its legs, and, collecting the sand therein, flies away and scatters it on the ground. The cavity, completed to the satisfaction of the insect, is then closed by a small stone, or several of the same, so carefully adjusted that it is with difficulty one can discover it again. Finally the insect procures flies or other insects, which it kills and deposits in the burrow, at the same time freely depositing its eggs amongst them. The larvæ when hatched from these eggs feed upon the insects entombed with them, finally pupating, and in a short time they burst from their tomb winged insects, as the parents. Of the above family of insects *Mellinus arvensis* collects flies in its burrow, *Ammophila gabulosa* collects caterpillars, *Philanthus triangulum* honey-bees, which it stings to death. *Pemphudon lugubris* burrows in decayed wood, and stores in its burrow various Aphides. All these insects collected are destined to feed the larvæ of the mason-wasps.—*William Finch, jun., Nottingham.*

ARION ATER, VAR. CINEREA, Westrel.—Mr. T. D. A. Cockerell has demurred on p. 114 of last SCIENCE-GOSSIP, in a note at the base of the second column, from my translation of var. *cinerea* of *Arion ater* in Westerlund's monograph on the Scandinavian Mollusca, but he, in transcribing the conchologist's own words, has reservedly kept what he considers to be the right meaning of its discoverer to himself. I myself put too great faith in Westerlund's naming to think for once that he ever named any other variety than an ash-coloured one *cinerea*, and this I take it is a very cogent reason indeed to describe the variety as an "ashy one," which I unqualifyingly did in the March instalment of my article; otherwise I cannot make any sense or reason out of "lateribus pallidis sesqui-pollicaris." "Sesqui-pollicaris" has a meaning to me in the

phrase "a thumb and a half," but I cannot for all the world of reason see its application in the description of a slug. Thumbs differ, and my thumb may be larger, equal to, or smaller than Mr. Cockerell's. But perhaps, as Mr. Cockerell has drawn attention to it, he will tell us. I am very pleased indeed to see that Mr. Baker Hudson has been so fortunate as to find those two rare slugs, *Arion ater*, var. *albolateralis*, Roebuck, and *Limax cinereo-niger*, Wolf. I was totally unaware of his finds, else I should have given them a notice in my article.—*J. W. Williams.*

FLIGHT OF BEES.—In reply to H. M. Lett, M.A.: supposing a bee was taken into quite a new locality, it surely could not "mark in its eye" a field of clover two miles off. If such is the case they must either have a wonderful vision, and can see an immense distance (in fact their eyes must possess a power perfectly telescopic), or they have the power, like a carrier pigeon, of remembering the *exact point* from which to start. Again it must be extremely difficult to tell what a bee does in a flight of, say, two miles. That they do "circle" is certain, for I have seen them, but this I admit has only occurred when starting and returning. I quite agree with Mr. Lett that on its return journey, when laden with sweets and perhaps pollen, instinct would suggest flying back in as straight a line as possible; but the mere fact of circling round "to mark in its eye" a starting-point must presuppose some experience, and in gaining that experience who can tell what may have occurred? Naturalists vary greatly; for instance, Goldsmith says: "Every bee when it leaves the hive to collect honey *enters into* the cup of the flower." I beg most distinctly to say every bee does nothing of the kind, for I have seen the common hedge-bee (there are about 221 species according to Kirby) break through the flower from the outside—even the common broad bean—and extract the honey that way. For instance, it would be quite impossible for bees to fly in a straight line in a very high wind; in fact, you may have a hive of bees in such an elevated position that one half will be killed by being dashed against rocks or trees, and blown into rivers, etc. I should certainly not contradict your correspondent; but it has been stated that the carpenter-bee varies the direction of her flight every journey she takes.—*Mark Antony.*

A SAD END TO NEST-BUILDING.—A missel-thrush began a nest in a fork of a large horse-chestnut tree in my garden, at Bolingbroke Grove, Wandsworth Common, and the unfinished nest was blown down. Nothing daunted, the bird tried again in the same place with the same result. It then took up a long piece of knotted string, which it found on the ground, to begin a third and, as it doubtless hoped, a more successful attempt. But, in arranging the string, one of the nooses got round the bird's neck, and, the other end having been made safe, foothold was somehow lost, and the poor builder hanged. Sad and piteous sight!—*J. P. Faunthorpe.*

CURIOUS INSTANCE OF TAMENESS IN FOX-CUBS.—On April 22 the shepherd from a neighbouring farm came and told us that a vixen was lying in an earth close to their farm buildings, and had eleven cubs with her; and that the "young 'uns," as he expressed it, were so tame that they would come out of the earth when whistled for. My sisters and I promptly walked up to the farm to have a look. It seems the cubs were born in an osier-bed, but when they began to cut the osiers, the vixen brought six cubs up to this farm, a distance of over a mile and a-half, one night, and, being watched, the second time was seen to bring five more. The owner of the land, thinking so many cubs would be too much for the vixen, put down a pan of milk by the earth, when the cubs always came out immediately and drank it up. On arriving at the earth the shepherd gave a whistle, and out tumbled eleven cubs, looking like so many little bears. They were wonderfully tame, allowing us to pick them up and stroke them without evincing the slightest signs of fear. They ran between our legs, worrying the toes of our boots, catching at our petticoats, and fighting over the bits of meat we gave them. It was the prettiest sight imaginable. The earth is on one side of a sort of dell; and when we left the cubs ran after us up the hill, but, on seeing a strange country at the top, went racing back to their old quarters. Are not eleven cubs an unusually large litter, and is it not a very rare thing for cubs bred in a wild state to become so tame?—*M. H. A.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

G. H. J.—The "Geological Magazine" is published by Trübner & Co., 57 and 59 Ludgate Hill, London, price 1*s*. 6*d*.

EXCHANGES.

WANTED, L. C.: 7th ed., 37, 45, 65, 85, 90, 119, 150, 153, 156, 159, 191, 194, 214, 215, 219, 345, 375, 404, 536, 542, 762, 912, 1029, 1115, 1251, 1266, 1279, 1293, 1303. Offered, 146, 236, 353, 500, 575, 693, 810, 859, 1026, 1270, 1309, 1314, 1327, 1482, 1503, 1646. Lists exchanged.—Frederic H. Ward, Springfield, near Tooting, S.W.

EXCELLENT slides of marine Algæ, in fruit, named from best recent authorities, offered for cabinet or boxes for slides.—T. H. Buffham, Comely Bank Road, Walthamstow.

EOCENE fossils (Barton and Hendon series) for others not in collection.—H. P. Dodridge, 7 Wharton Street, King's Cross, W.C.

WANTED, the vols. of SCIENCE-GOSSIP for 1871 and 1872, bound or in parts. Will give 12 good micro slides for each year.—John J. Andrew, L.D.S. Eng.

SPY'S "Cruise of the Challenger," "Naturalist's Wanderings in the Eastern Archipelago," "Geology of Boston," etc. Very fine American minerals. Very choice American fossils, such as the famous Illinois fern nodular fossils, scaphites, baculites, Bronthotherium teeth, etc. I would like offers of books, minerals, fossils, microscope apparatus, slides mounted, or crude material. Would like a good microscope complete, objectives, glass stereopticon views, etc.—Address, W. S. Beckman, West Medford, viâ Boston, Mass., U.S.A. P.O.B. 108.

WILL exchange Barton fossils for those of other formations.—H. Elmes, 45 Wharton Street, W.C.

WANTED, clutches of eggs of many British species of birds. Will give in exchange natural history specimens.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

THE undersigned would feel greatly indebted to collectors in Great Britain and on the Continent for examples of the Unionidæ (freshwater mussels) of their district, and would do his best to make a suitable return in shells.—G. Sherriff Tye, 10 Richmond Road, Handsworth, near Birmingham.

MICROSCOPIC objects for sale, or exchange scientific books (microscopical preferred) or lantern slides.—S. Harrison, Dalmain Road, Forest Hill.

WANTED, collections of old foreign stamps. Will give in exchange natural history specimens.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

WANTED, collection of birds' eggs or old coins in exchange for lantern transparencies, physiological and other subjects.—Apply to Robert Millikin, Kirkcaldy, N.B.

SCIENCE-GOSSIP, 1865–68, 1870, 1883–85. "Midland Naturalist," 1884–85. Exchange for Cooke's "Rust, Smut, Mildew, and Mould," books on lichens and mosses, or botanical micro slides. —Musson, 23 Mapperley Hill, Nottingham.

WANTED, Savile Kent's "Manual of the Infusoria." Other works in exchange.—C. L. Lord, 34 Burlington Crescent, Goole.

WANTED, first-class slides of Algæ, fungi, eggs of insects, selected diatoms, spines of Echini, etc. Will give well-mounted insect preparations in exchange.—C. Collins, Bristol House, Harlesden, N.W.

WANTED, the rarer species and local varieties of British land and freshwater shells. Will give in exchange good specimens of *Pis. pusillum, nitidum*, and *roseum. L. glutinosa, Limax lævis, Test. haliotidea, H. pygmæa, V. antivertigo, B. perversa, Cl. biplicata*, and *Coch. tridens*.—F. Fenn, 20 Woodstock Road, Bedford Park. Chiswick, W.

WILL exchange for shells or butterflies: "The Field Naturalist's Handbook" (Wood & Wood, pub. 5*s*.); "Notes on Collecting and Preserving Natural History Specimens," illustrated (Taylor, new ed., pub. 3*s*. 6*d*.); "Collector's Handbook" (J. Nave, plates); "The Aquarium" (Taylor, new ed., 1884); C. Lyell's "Elements of Geology;" perfectly clean, not the least soiled.—James Taylor, Duke of York Hotel, Eccles.

OFFERS requested for good 10-keyed B-flat clarinet; concertina preferred.—Florisborne, Stevenage, Herts.

"HALF-HOURS in the Green Lanes," Taylor; "Gamekeeper at Home," Jefferies; vols. i.–iv. "Popular Educator;" first seven parts of Cassell's "European Butterflies and Moths:" first sixteen "European Ferns;" first fourteen "Natural History." Offers or good botanical lens.—A. Pharaoh, Braintree, Essex.

BAINES' "Yorkshire Past and Present," 2 vols., gilt edges, full bound, scarlet leather, gilt extra, plates, etc., in perfect condition. Wanted in exchange, Beale's "Protoplasm," Frey's "Manual of Histology," Huxley's "Lay Sermons," Cooke's "British Fungi," or Cole's "Studies," with slides, for 1883 and 1884, or offers.—G. Swainson, 110 Park Road, Bolton.

WILL send list of recent school-books in proposed exchange for good diatom slides and micro fungi, etc.—G. Swainson, 110 Park Road, Bolton.

WANTED, some good specimens of glass rope sponge (*Euplectella aspergillum* and *cucumer*), varieties of coral, and curious foreign shells. Particulars to I. J. J., 16 Waterloo Road North, Wolverhampton.

WANTED, Darwin's "Origin of Species" and "Descent of Man," Spencer's "Principles of Biology" and "Study of Sociology," Huxley's "Lay Sermons."—W. R. Hopkins, 33 St. Botolph's, Colchester.

WANTED, plant remains from any formation in exchange for other fossils, from Chalk, Greensand, etc. Send list.—George E. East, jun., 10 Basinghall Street, London, E.C.

WANTED, good land and freshwater shells (British) in exchange for "Ants, Bees, and Wasps," by Sir John Lubbock.—Robert Cairns, The Grove, Currier Lane, Ashton-under-Lyne.

WANTED, macro and micro Lepidoptera, also books on beetles, bees, spiders, etc.—W. Macmillan, Castle Cory, Somerset.

OFFERED, L. C., 2, 104, 130 B, 130 C, 136, 146, 226, 237, 239, 313, 399, 611, 817, 831, 912, 999, 1014, 1015, 1141, 1304, 1321, 1349, 1483, 1504, 1519, 1630, 1654. See also former numbers of this paper. Many desiderata.—W. S. Harrison, 15 Park Place East, Sunderland.

1110 fossils, 250 species, from various formations, offered for electrical apparatus. Suitable for science teacher.—J. A. Hargreaves, Baildon Woodbottom, Shipley, Yorkshire.

FOR exchange, Rennie's "Field Naturalist," vol. i., 1833–34; twelve numbers of Newman's "Entomologist," 1872–73. Wanted, Dr. Cooke's "Ponds and Ditches," Nicholson's "Advanced Zoology," Buckland's "British Fishes," or botanical collecting case.—T. J. Porter, Perranarworthal, Cornwall.

WANTED, perfectly fresh specimens of *Œcidium compositarum* on the leaves of the coltsfoot, and of *Œcidium berberidis* on the leaves of the barberry. Exchange, micro slides. Before sending, communicate with A. J. Doherty, 33 Burlington Street, Manchester.

WANTED, botflies (*Œstrus boris* and *Œstrus ovis*), with the larvæ and pupæ preserved in acetic acid or spirit, or mounted, in exchange for rare Acari, Foraminifera, and other micro slides. —H. E. Freeman, 60 Plimsoll Road, Finsbury Park, N.

Helix Skinneri, H. Waltoni, H. Rivolii, Cyclophorus menkiana, C. annulata, Cataulus decorus, C. Templemanii, and many other land shells from Ceylon. State offers in foreign shells or continental fossils.—Miss Linter, Arragon Close, Twickenham.

CAN offer sections of clematis, stained six different colours, also about three dozen varieties of animal hair, and about one dozen varieties of feathers, brilliant natural colours, in exchange for slides or unmounted objects.—A. Harvey Williams, Hythe, Kent.

WANTED, egg cabinet. Will exchange cylinder electric machine in case, 2 quart Leyden jars, discharging rod, etc.—E. J. Towill, 5 Alexander Road, Hoylake.

FIVE vols. of Jardine's "Naturalist's Library," with coloured plates complete, in exchange for any one vol. of Wood's "Natural History."—J. H. K., 18 Church Street, Commercial Street, E.

WANTED, books on science, natural history, sports and pastimes, or good illustrated books, in exchange for valuable architectural works. Returnable list sent.—P. Payne, The Borough, Hinckley.

SEVERAL hundred odd numbers of "English Mechanic" between 324 and 938, and wish to exchange two of them for one No. 1 of the "Northern Microscopist," or reply paid offers.—Whitmarsh, Wilton.

WANTED, good works on "china marks," in exchange for British land and freshwater shells (also a few marine), North American shells, green-house exotic ferns, blooming plants (not bedding), and the finest varieties of the cactus tribe, and fossils.—E. R. F., 82 Abbey Street, Faversham, Kent.

"THE OCEAN," P. H. Gosse, and "The Natural History of Selborne," Gilbert White (both new). What offers in micro slides or material?—C. H. O., 51 Melbourne Grove, S.E.

WANTED, Carpenter's or Beale's "Microscope Manual." Exchange only. Cassell's "European Ferns," handsomely bound, value 22*s*. 6*d*., or 3 vols. "Amateur Work," value 31*s*. 6*d*.—Mr. Ebbage, 165 Hagley Road, Birmingham.

GOOD octagon aquarium, slate bottom, in good condition, size about 18 in. by 15 in.; will exchange for good microscopic objects or unmounted material, or offers. No books.—R. Mason, 24 Park Road, Clapham, S.W.

WANTED, to correspond with a worker in marine Polyzoa and Hydrozoa.—Geo. Merritt, 282 Commercial Road, London, E.

FOR exchange, Joseph's "A.B.C." water-testing apparatus (12*s*. 6*d*.), with pamphlet, most interesting; will take Cooke's "British Fungi," back numbers of SCIENCE-GOSSIP—1884, 1885 especially—or well-mounted micro slides.—H.W. Case, Cotham, Bristol.

WANTED, clutches of British birds' eggs, especially from remote districts.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

WANTED, very old collections of foreign postage stamps; natural history specimens offered in exchange.—W. K. Mann, Wellington Terrace, Clifton, Bristol.

BOOKS, ETC., RECEIVED.

"Bees and Bee-Keeping: Scientific and Practical," vol. i., by F. R. Cheshire (London: L. Upcott Gill).—"Outlines of Geology," by Dr. James Geikie (London: Ed. Stanford).—"Upland and Meadow," by Dr. C. C. Abbott (London: Sampson Low & Co.)—"British Fungi," by the Rev. James Stevenson (London and Edinburgh: W. Blackwood & Sons).—"Our Island Continent," by Dr. J. E. Taylor (London: S. P. C. K.).—"The Naturalist's Diary," by Charles Roberts (London: Swan Sonnenschein & Co.).—"The Young Collector: Seaweeds, Shells, and Fossils," by Peter Gray and B. B. Woodward.—"English Coins and Tokens," by St. Jewill and B. V. Head (London: Swan Sonnenschein & Co.).—"Official Year-Book of the Scientific and Learned Societies of Great Britain" (London: Charles Griffin & Co.).—"Malvern: its Flowers, Ferns, Butterflies, Minerals, Fossils, and Birds," by C. E. Mackie (Malvern: "Advertiser" Office).—"Photography for Amateurs," by T. C. Hepworth (London: Cassell & Co.).—"The Rotifera," by Dr. C. T. Hudson and P. H. Gosse, part iii. (London: Longmans & Co.).—"British Petrography," by J. J. Harris Teall, part iv. (Birmingham: Watson Bros.).—"Sixteenth Annual Report, Wellington College Nat. Science Society."—"Proceedings of Royal Society of Tasmania for 1885."—"Transactions of Hertfordshire Nat. Hist. Society."—"The Fungi of the North of Ireland," by H. W. Lett.—"Brooks' Popular Botany," No. 1.—"Journal of the Royal Microscopical Society" (April).—"The Scientific Enquirer," May.—"The Hoosier Naturalist."—"The Garner," May.—"The Asclepiad."—"The Canadian Entomologist."—"The Botanical Gazette."—"Ben Brierley's Journal."—"Illustrated Science Monthly."—"Revista Scientifica," Porto.—"Journal of the New York Microscopical Society."—"Science."—"Proceedings of the Academy of Natural Science of Philadelphia."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The Naturalist."—"Journal of the Quekett Microscopical Club."—"The American Naturalist."—&c. &c.

COMMUNICATIONS RECEIVED UP TO THE 13TH ULT. FROM: H. C.—W. A. G.—F. B.—J. E. L.—C. P.—C. J. J.—C. L. L.—G. S. T.—C. T. M.—G. E. M.—P. E. D.—S. H. D.—W. H. R.—A. C.—J. P. G.—F. H.—H. D.—O. R.—J. P.—H. A. C.—J. M.—F. W.—W. K. M.—W. C. G.—W. B. C.—H. P. D.—J. H.—W. F. jun.—J. H. L.—T. H. B.—F. F.—J. P. F.—H. D.—W. T. C.—J. W. W.—J. J. A.—C. C. jun.—H. E.—A. H.—C. C.—W. S.—J. T.—F. H. W.—E. H.—C. S. S.—H. L. C.—W. M. W.—R. I. W.—E. R. F.—C. H. O.—E.—A. M. S. W.—W. W.—E. J. T.—P. P.—G. E. M.—I. H. K.—W. G. W.—M. H. A.—A. W. S.—W. I. V.—T. J. P.—J. A. H.—C. C. S.—W. M.—T. D. A. C.—R. S. W.—R. C.—W. S. H.—I. J. T.—J. J. G.—G. E. E.—W. R. S.—G. S.—A. H. W.—A. R. W.—H. E. F. A. B.—A. P.—A. J. D.—W. S.—T. C. H.—R. M.—T. F.—C. W.—D. E. P.—W. M.—T. W. S.—J. R. &c. &c. &c.

HISTORY OF THE STRAWBERRY.

By HAMPDEN G. GLASSPOOLE.

[*Concluded from p.* 129.]

DURING the eighteenth century no marked improvement took place in strawberry culture. Langley, in his "Pomona," published in 1729, enumerates only three kinds: the scarlet, the hautbois, and the wood. The scarlet is a native of Virginia, and has been an inhabitant of our gardens for more than two hundred years. The introduction and history of the hautbois strawberry has never been well ascertained, though it is generally believed to be the mountain strawberry of Bohemia, and to have been first improved by cultivation in France. The name of this variety is probably derived from the circumstance of the lengthy scape or stem which bears the fruit standing higher than the long-stalked leaves, and consequently being called hautbois (high wood). It is not improbable, however, that its original locality, in the high woods of Bohemia, may have suggested the name. In old gardening books it is written "hautboy."

About 1766 the Alpine strawberry was introduced. It is said that George III. received the seed from Turin, and that it was sold at a guinea a pinch. Nevertheless, after a few years beds of this plant were to be seen in almost every fruit-garden. In the early part of the last century the Alpine strawberry of Chili was introduced into the Royal Gardens at Paris, and thence found its way over many parts of Europe. Mr. Knight, the President of the Royal Horticultural Society in 1809, devoted his attention, talent, and fortune to the perfecting of fruits, and to none more perseveringly than the strawberry. In his time the strawberry of the garden, however rich, was small, and unwilling to bear abundantly, compared with the sorts now in cultivation. But the experiments of Mr. Knight led to the production of a race of which the British Queen was the great example, and from which that called the Princess Alice Maud is another form. The varieties of the strawberry, like those of other fruits, have been so increased by care and cultivation that to describe them distinctly in an article like this would be almost impossible. No English fruit can stand in competition with the strawberry for wholesome and salubrious qualities. The fruit consists almost entirely of matter which is soluble in the stomach, and which neither when eaten nor laid together in a heap ever undergoes acetous fermentation. Hence they are very nourishing, and may be eaten in quantities without any bad consequences, as is the case with plums and many other sorts of fruit. It is said they dissolve the tartarous incrustations of the teeth, promote perspiration; and persons afflicted with gout have found relief from using them very largely. We are told that Linnæus kept himself almost free from this distressing complaint by eating plentifully of this fruit whenever it was in season. Hoffmann says he has known consumption to be cured by them. The bark of the root and the leaves are moderately astringent, and were often used as gargles, etc. Lord Bacon says: "Among the flowers that yieldeth the sweetest smell in the air he reckoned violets, and next to them is the musk rose, then the strawberry-leaves in autumn, dying with a most excellent cordial smell." This delicious cordial smell is said to be only discernible to those who have aristocratic blood in their veins. The leaves of this plant have been chosen as a badge to adorn the coronets of our highest nobles. The ducal coronet is ornamented with eight strawberry leaves, that of a marquis has four, but viscounts and barons have no ornamentation of these leaves. Since 1715, the base of an archbishop's mitre has been a ducal coronet, consequently the

strawberry-leaves are present. The expression, "He aspires to the strawberry-leaves," has been employed by the late Earl of Beaconsfield in his early novels. "The reason," says Mrs. Bayle Bernard, "if any, why this leaf in particular was advanced to such a dignity the heralds have not vouchsafed to inform us; but the ornament is not the less prized by its possessor from ignorance of its derivation; and the lower ten millions, whose ignoble heads it can never wreathe, may console themselves for the deprivation by the reflection, that none who can secure the fruit need envy those who wear the leaves."*

There has been much controversy as to the origin of the English name of this plant. According to some old authors, it was derived from the use of straw to protect the plant in winter. Thus, old Tusser, in his "Husbandry for December," says:—

"The strawberries look to be covered with straw,
Laid evenly trim upon crotches and bows,
And after uncovered as the weather allows."

But the word has nothing to do with straw, for we find it spelt in various ways in old books. It was not until the fifteenth century, in a pictorial vocabulary, that it appeared in its present form. The word no doubt is derived from the Saxon "streowberrie," a straying plant that bears berries. Bishop Latimer used to call the non-resident country clergy "strawberry preachers," because they strayed from their parishes, to which they returned only once a year. Kent is said to be the Garden of England, both as regards soil and climate. In 1877 nearly 12,000 acres were devoted to the growing of small fruits: gooseberries, currants, strawberries, and raspberries. The quantities of these fruits sent annually to London and other large towns are enormous. One extensive grower in Kent, in 1876, sent 125 tons of strawberries to the London market; and another grower, in 1877, sent in one day 2500 pecks.† The village of Bexley may be regarded as the centre of the strawberry supply for the London market.

Swallows.—The storm of rain, culminating in a heavy fall of snow, on Wednesday, the 12th of May, 1886, proved most destructive to our twittering summer visitants, the swallows. About my own neighbourhood they fluttered into outhouses and fell dead, in some instances actually entering the cottage doors and dropping lifeless on the floor; while near Lurgan, in East Armagh, I heard of six hundred swallows being found dead about one house on the shore of Lough Neagh, a spot where they usually congregate to feed on the insects which abound over the shallow waters. I have seen but very few since the day named, and fear they have been all but exterminated in the north of Ireland. Have other observers noted the same mortality?—*H. W. Lett, M.A.*

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* "Our Common Fruits."
† "The Garden,' vol. xii.

ON THE VARIATION AND CONTINENTAL DISTRIBUTION OF THE BRITISH SLUGS.

By J. W. Williams, D.Sc., etc.

[*Continued from p.* 99.]

LIMAX AGRESTIS, Linn.—This species has a very wide distribution. Besides being found in the greater part of Britain, it occurs in Greenland, Finland, Russia, Germany, Spain, Portugal, Italy, Corsica, Algeria, Madeira, and the Azores, even extending into Siberia, Massachusetts and Canada in America.

Var. *cineracea**, Moq.: animal greyish-white; mantle ashy (= type). Generally distributed.

Var. *albida**, Picard: animal greyish-white, spotless, with sometimes two lateral greyish bands (scarcely obvious) on the shield. French.

Var. *filans*, Hoy: animal greyish-white or ashy; mantle yellowish. French, Italian.

Var. *sylvatica**, Drap.: animal greyish, mottled. ("Animal d'un violet bleuâtre, ou lie de vin, ou grisâtre avec des taches irrégulières; tête souvent d'un brun clair."—Moquin-Tandon.)

Subvar. *clypeo-fasciata*, Dumont and Mortillet: animal of normal colour, with spots or bands of a deeper hue on the mantle. Common in France.

Subvar. *clypeo-concolor*, Dumont and Mortillet: animal like the preceding, but without spots or bands on the mantle. Less common than subvar. *clypeo-fasciata* in France.

Subvar. *immaculata*, Dumont and Mortillet: animal pale-coloured, spotless, bandless.

Var. *melanocephala*, Moq.: animal greyish-white, with black head. French.

Var. *punctata**, Moq.: animal greyish or white, with very small black spots. French. My sister has sent me several of these from Stourport.

Var. *lilacina**, Moq.: animal lilac or brown-lilac, spotless. French.

Var. *ornata*, Moq.: animal yellowish, spotted with black; mantle with two blackish or brown bands. French.

Var. *obscura*, Moq.: animal reddish with brown spots. Common in the subalpine regions of France (Dumont and Mortillet).

Var. *nigra**, Butterell: animal black.

Var. *tristis**, Moq.: animal brownish, mantle with two lateral brown bands, and sometimes a third intermediate band. Rare in France, and found in the subalpine regions. Paulucci found it in Calabria, and Doderlein at Palermo.

Var. *reticulata**, Müll.: animal red or reddish-grey, with irregular blackish spots. Moderately common in Italy and France.

Var. *rufescens*, Pini: = var. *obscura*, Moq.

Var. *varians*, Westerl.: animal grey, spotted and variegated with black neck above and tentacles fuscous. Scandinavian.

Var. *submaculata* *, Williams : body greyish-white, streaked with seal-brown on the back, which extends into the mantle and covers its posterior two-thirds; the sides of the body and the anterior third of the mantle are free from streaks and spotted with black. This new variety seems to me intermediate between Moquin-Tandon's *punctata* and Westerlund's *varians*. It was sent to me by Miss M. E. Williams, from Stourport.

Var. *atritentaculata*, Dumont and Mortillet : animal greyish-white, spotless, tentacles black. Savoy and Haute-Savoie. (The same authors describe a var. *albitentaculata* as "blanc-grisâtre, sans taches, avec les flancs parfois un peu plus clairs," but this seems to me very much like playing with names.)

Var. *fasciata*, Dumont and Mortillet : animal white, with a black band on the sides. This variety is common in the Alpine and subalpine regions of France.

Var. *rufescens*, Dumont and Mortillet : animal yellowish, spotless, bandless. Common in the French subalpine regions.

Var. *nigricans* *, Westerl. : animal grey, variegated with black spots crowded together; tentacles and neck with a black line on the sides. Scandinavian. (Rests as British on doubtful grounds.)

Var. *Veranyani*, Boettger : animal ashy, marked with small black spots (= var. *punctata*, Moq. ?). Italian. Found by Lessona in Liguria.

Var. *florentina*, Lessona and Pollonera : animal large, white, ornamented with blackish-brown spots. Found in Tuscany near Florence, by Lessona.

Var. *aurata*, Lessona : shield and back yellow, unicolor; tentacles black. Found at Groscavallo in the valley of the Lanzo, by Lessona. Italian.

LIMAX MAXIMUS, Linn. — Found in nearly all France, and in a great part of central Europe, Finland, Russia, Corsica, Madeira, and the Azores.

Var. *Ferrussaci* *, Moq. : animal whitish, with four rows of black spots on mantle and body. French. In Italy it has been found in Lombardy by Pini, in Tuscany and Calabria by Paulucci, and in Sardinia by Gené.

Var. *cellaria* *, D'Argenville : animal ashy, mantle spotted with black, back with bands of the same colour, interrupted, and presenting alternating lines and points. Common everywhere, according to Locard, in France, and according to Lessona common in Italy.

Var. *quadrifasciata*, Dumont and Mortillet : animal ashy, with the superior bands entire; the inferior band presents some alternating lines or points. Found in Savoy and Haute-Savoie, but rare. French.

Var. *continuata*, Dumont and Mortillet : animal ashy, with three entire black bands on each side. Moderately common in Savoy and Haute-Savoie (Locard). French.

Var. *maculata* * (Picard), Moq. : animal ashy, mantle and back with irregular black spots. Picard found this in the valley of the Somme, and according to Locard it is common in the Savoy and in Isère. Lessona and Pollonera describe it as occurring in all Italy and in Sardinia.

Var. *nebulosa*, Dumont and Mortillet : "Animal cendré, les fascies se fondant dans une teinte générale qui se rebrunit" (Locard, in his "Etudes sur les variations malacologiques d'après la faune vivante et fossile de la partie australe du Bassin du Rhône"). Found at Saint-Gervais in France, but very rare.

Var. *vulgaris* *, Moq. : animal grey, shield spotted with black; back banded with the same colour (= type). Common almost everywhere, both in Britain and France. In Italy De Bette found it at Veneto, Issel in Tuscany, and Paulucci in Calabria.

Var. *serpentina*, Moq. : animal ashy, shield spotted with black; back with some bands of the same colour, the two middle ones being straight and scarcely bent, the two intermediate ones larger and in an irregular zigzag, while the two marginal ones are interrupted. Found by Locard, where it is moderately common, in the environs of Lyons. Italian.

Var. *Johnstoni* *, Moq. : animal ashy, mantle spotted with black; back marked with spots and two bands of the same colour. French. Pini found it in Lombardy. (Roebuck describes a subvar. *lilacina* as British, which differs from the above only in the ground-colour being lilac instead of ashy.)

Var. *Aldrovandi*, Moq. : animal ashy, back with some whitish spots. French.

Var. *fasciata* *, Moq. : animal of a deep ash colour with whitish bands, often five in number. Moquin found this in the Pyrenees, and Lessona describes it from Piedmont.

Var. *limbata*, Moq. : animal ashy, foot-margin white. French.

Var. *Mülleri* : animal ashy, back with white bands, and a double row of black spots. French.

Var. *cinerea* *, Moq. : animal ashy, spotless, mantle bluish-black. French.

Var. *obscura* *, Moq. : animal wholly brown. Moquin-Tandon found this in the environs of Paris.

Var. *rufescens* *, Moq. : animal reddish, unicolor, more or less pale. French. Environs of Paris.

Var. *candida*, Less. : animal white. Italian. Found by Paulucci in Nivoli.

Var. *concolor*, Pini : animal pale ashy, sole and keel paler, mantle grey. Pini found this in Esino and Lombardy, and Paulucci in Tuscany. Italian.

Var. *bivonæ*, Lessona and Pollonera : animal fuscous, chestnut-coloured, unicolor. Found in Palermo by Doderlein. Italian.

Var. *sordida*, Less. : animal pale brown, back fuscous; keel and two pale bands often obsolete. Found in Tuscany. Italian.

Var. *marmorata* *, Cockerell : animal light greyish-brown; mantle marbled and spotted, darker in the anterior and lighter in the posterior part (where it shades into a grey); the bands are grey, ill-defined,

but fairly distinct, and there are black spots scattered here and there. Mr. A. E. Cook has sent me this from Bath.

Var. *submaculata*, Boettger: animal brownish or yellowish-brown, mantle unicolor; body mottled with a darker colour; keel well marked and colour of ground colour. Grecian.

Var. *carbonaria*, Boettger: animal very black above, unicolor; sides a little lighter, sole brownish; foot-fringe blackish, keel short, extending to one-fourth of back, black; mantle rounded behind. Grecian.

(*To be continued.*)

CHAPTERS ON ANIMAL PARASITES.

By W. A. Hyslop.

No. III.

HAVING now noticed the various kinds of animal parasites, we will, as before mentioned, consider more particularly the Anoplura, or lice. I may say in passing that M. Piaget, in his large book "Les Pediculines" (which, along with the Appendix just published, is the standard work on the subject), objects to the term Anoplura, and suggests "Pediculines;" but this term, it seems to me, is apt to be confounded with the word Pediculus, one of the subdivisions of the Anoplura. The following classification, based upon that of M. Piaget, shows at a glance the various sub-genera; and I propose taking each up singly, and, by the aid of illustrations, showing as shortly as possible the differences between them, so as to aid in the classification and arrangement of any specimens which the readers of Science-Gossip may have:—

Classification.

- Anoplura
  - Haustellata – Pediculidæ
    - Phthirius
    - Pediculus
    - Pedicinus
    - Hæmatopinus
    - Echinophthirius
    - Hæmatomyzus
  - Mallophaga or Mandibulata
    - Philopteridæ (antennæ filiform)
      - Philopterus (antennæ five-jointed)
        - Docophorus
        - Nirmus
        - Akidoproctus
        - Onacophorus
        - Goniodes
        - Goniocotes
        - Lipeurus
        - Ornithobius
      - Trichodectes (antennæ three-jointed)
    - Liotheidæ (antennæ clavate)
      - Lithiœum
        - Colpocephalum
        - Menopon
        - Nitzschia
        - Læmobothrium
        - Trinoton
        - Physostomum
        - Eureum
      - Gyropus

In addition to M. Piaget's book, which is in French, we have in English Denny's "Anopluorum Britanniæ" published in 1842, and Murray's "Aptera," which treats of Ixodes and Acari as well as Anoplura.

The Anoplura do not pass through any proper metamorphosis, the young being similar to the adult except in size, and that the legs are thicker; and the young parasite is altogether more clumsy than the adult, and of a white colour. The eggs are fixed by a glutinous secretion to the barrel of the feathers, or to the hairs of their hosts, and form very beautiful microscopic objects. (See Science-Gossip for 1870, page 132.)

As will be seen on referring to the classification, there are two great subdivisions, the Haustellata and the Mandibulata, which are easily distinguished, the former being armed with a sucking mouth and the latter with mandibles. The Haustellata are entirely confined to Mammalia, the Mandibulata, with the exception of two sub-genera, to birds.

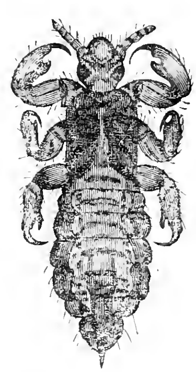


Fig. 94.—Pediculus of Monkey, ♂. × 60.

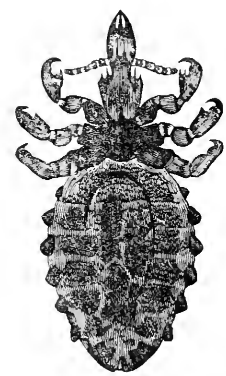


Fig. 95.—Hæmatopinus of Horse. × 20.

The Haustellata consists of only one family, the Pediculidæ, which is divided into six genera:—

1. Phthirius is found on man only, viz., as the crab-louse. The body is square and crab-like, and the legs of two kinds, the anterior being ambulatory and the posterior scansorial.

2. Pediculus infests man and also the monkey. The species found on the monkey (see Fig. 94), though this is not the common monkey parasite, is very like that found on man, only darker in the colour. The antennæ are five-jointed.

3. Pedicinus.—This genus is entirely confined to monkeys, and some of the species are very like the Pediculi, but are readily distinguished by the antennæ having only three joints.

4. Hæmatopinus.—This genus also resembles the Pediculi, and most Mammalia have a species peculiar to themselves; and, curious to say, the cow and calf are infested by distinct varieties. Fig. 95 (being the species found on the horse) is a typical example. The legs are scansorial and very thick, the antennæ

five-jointed, and the abdomen variable in shape and consisting of eight or nine segments.

5. Echinophthirius. There is only one species of this genus, viz. that found on the seal (see Fig. 96), which has been classified by some as a Hæmatopinus; the antennæ however are only four-jointed.

6. Hæmatomyzus consists of only one species (see Fig. 97), which infests the elephant. This species is easily distinguished by its long fleshy haustellum, which is terminated by barbs like the Ixodes. This structure of the mouth is evidently a necessity for the parasite's existence, as without the long barbed

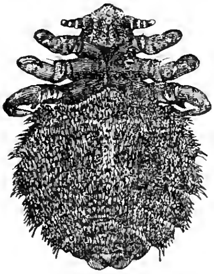


Fig. 96.—Echinophthirius of Seal. × 60.

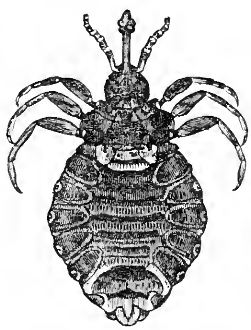


Fig. 97.—Hæmatomyzus of Elephant. × 20.

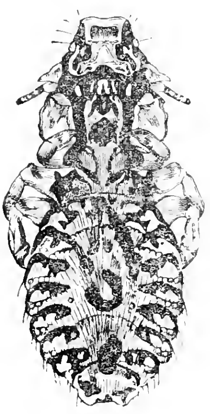


Fig. 98.—Docophorus of Rook. × 60.

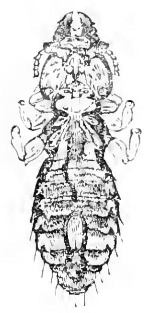


Fig. 99.—Nirmus of Oyster-Catcher, ♂. × 60.

haustellum it would never be able to pierce the thick hide of the elephant.

We now come to the second of our large divisions, subdivided into two families, which are distinguished by the structure of the antennæ. In the Philopteridæ the antennæ are filiform, in the Liotheidæ clavate. The Philopteridæ are divided into two distinct classes, the first having the antennæ five-jointed and the second three-jointed.

1. Docophorus.—This is perhaps the most plentiful of all the species, and is distinguished by the presence of trabeculæ, i.e. small movable organs immediately in front of the antennæ. The only genus likely to be confused with this is the next:—

2. Nirmus.—Some of the Nirmi have trabeculæ like the Docophori, but generally of smaller size. The chief difference however between the two genera is that in the latter the species are nearly always much more slim than in the former, and the head not so broad at the base.

THE NATURAL PRESERVATION OF ROTIFERA AND OTHER POND ORGANISMS.

By E. B. L. Brayley.

LOVERS of pond life must continually regret the paucity of published information on the natural and permanent preservation of the various organisms found by them in their gatherings. And when some specially rare form has been found, half the joy caused by the find is dissipated by the knowledge that in a general way it cannot be relegated to the safe custody of the cabinet for future reference and exhibition, but must be gloated over whilst it lives, as very probably the observer may not again come across a similar form for many years. Besides which the veracity and the genuineness of the find may be impugned by a jealous and less fortunate *confrère*. The following notes may therefore be of interest to some of the pond-hunting readers of Science-Gossip, and I feel sure, if some other workers also published the results of their labours, valuable formulæ would be discovered, and much fresh information would accrue. Whilst specially experimenting on the Rotifera and Infusoria, I have also tried most of the organisms met with in general gatherings. Any weak point in the formulæ I shall point out, in the hope that some reader may be able to overcome the difficulty.

Rotifera.—By the aid of the annexed (I think original) formula, I have been enabled, amongst others, to mount the following forms: Melicerta, Œcistes, Stephanoceros, Asplanchna, Synchæta, Eosphora, Scaridium, etc., the tube-dwellers all fully extended from their tubes, and the others with cilia exserted in a natural manner. In the transparent forms the internal structure can be easily studied.

Chromo-salicylic solution.—Chromic acid, 2 grains; Saturated aqueous solution of salicylic acid, $\frac{1}{4}$ oz.; distilled water, 1 oz. Add about two drops of the above to each teaspoonful of the water containing the rotifers. Its action should be very slow, taking six or more hours to kill, the animal swimming about as usual for some time. If too much be used the rotifer at once doubles up, swells, and is useless. The water should hardly be perceptibly tinted. Mount in the same water in which the creature is killed. It is preservative as well as fixative. With muddy water, transfer rotifer to clean before adding solution. With Floscules it is advisable to fix in same cell they are intended to be finally mounted in, as moving disarranges the setæ. To study internal

structure, first starve the rotifer for a few hours in clean water. There are two points which make failure possible. First, the exact quantity to use—this can be acquired by practice alone: use as little as possible. Second, in certain waters a thick deposit is thrown down some hours after the solution is added: the only way to obviate this is to transfer rotifers to fresh water and try again. I have some mounts of *Asplanchna priodonta*, as perfect now as when first put up two years since. Seal with Ward's brown cement: this had better be used with all the organisms; it is very reliable and easy to work.

INFUSORIA.—A great deal has yet to be learnt with regard to the preservation of these animalcula, as that which fixes some naturally, is useless with others. For Carchesium and other Vorticellina:—

Saturated solution of picric acid.—Apply suddenly when the zöids are extended; well wash in alcohol. To stain prepare as follows: Alcohol, 75 %, 2 oz.; hydrochloric acid, 4 drops; carmine, 3 grains. Boil this preparation slowly for ten minutes; when cold, filter. If the stain shows a tendency to yellowness, add one or two drops of ammonia, until the right colour is restored, and filter again. After staining wash out excessive stain in acidulated alcohol, then transfer through absolute alcohol and cloves to balsam. The transference into the cloves must be carefully done, or great shrinking will take place; introduce a few drops of oil of cloves into the bottom of a precipitating glass containing the alcohol, and let the stained infusoria gravitate into the cloves, then withdraw the alcohol, add a little more cloves, and transfer into balsam. Picric acid will not satisfactorily kill Paramecium, Urostyla, etc.

Salicylic vinegar.—Pyroligneous acid, 100 parts; salicylic acid, 1 part. This will be found the most generally useful. It kills such forms as Paramecium, Coleps, Spirostomum, Stentor, etc., and certain Vorticellæ fully extended, and can be used as a mounting medium.

Saturated solution of bichloride of mercury.—Very useful for fixing Paramecium, Urostyla, etc., but generally causes Vorticellæ to contract. Great care must be taken to wash away every trace before mounting.

The efficacy of all the foregoing solutions largely depends on the particular medium used being applied suddenly and in a concentrated form. By that I mean, have as little water surrounding the infusoria as possible.

Osmic acid.—Very useful at times, applied as a vapour. Put drop of water with infusoria on cover glass, and hold over mouth of bottle containing osmic solution. A drop applied to water containing any Tentaculifera fixes them most satisfactorily. Care must be taken not to use too much, or they will become blackened and useless.

I have never got very good results from potassic iodide or perchloride of iron solutions.

ENTOMOSTRACA and small larvæ can be fixed with bichloride of mercury; and, after being thoroughly washed, mounted in Nolls' medium, as under: Salicylic vinegar (as above), 1 vol.; dilute glycerine (glycerine 1 vol., water 4 vols.), 10 vols.; Farrant's medium, 11 vols. This is generally a most useful fluid to keep by one, but does not answer where the integument of the object is very chitinous.

VERMES.—Picric acid solution, or bichloride of mercury; either fixes admirably.

HYDRÆ.—Put a Hydra into watch-glass with as little water as possible; when it is fully extended add suddenly bichloride of mercury solution; well wash and mount in Nolls' medium.

HYDRACHNEA.—These may be splendidly preserved by putting them living into a cell containing a saturated solution of boro-glyceride, and sealing the mount down. The animal will probably live in this for a day or two, and then will be perfectly preserved in form and colour.

ALGÆ.—A few drops of saturated aqueous solution of salicylic acid added to the water containing them will preserve Volvox (showing cilia), Spirogyra, without contracting chlorophyll spirals, etc. Use very little of the solution, otherwise it will bleach.

I may remark that I have in my cabinet mounts of all the forms referred to, preserved in the way mentioned, and I should be very glad to see through the pages of SCIENCE-GOSSIP any other hints as to the preservation of pond organisms, but more particularly the Rotifera and Infusoria.

THE POISONOUS PROPERTIES OF THE YEW.

SEEING that, according to a note in the June issue of SCIENCE-GOSSIP (page 142), there still remains some uncertainty, not to say ignorance, as to certain characteristics of the yew, I am induced to offer a few notes on the subject.

The yew, *Taxus baccata*, or English yew, is sufficiently well-known, and need not be described. The Irish yew, *Taxus fastigiata*, differs slightly with regard to the leaves, and considerably as to the general appearance of the tree. The wood of the yew is tough and hard, and is now chiefly used for cabinet-work.

That the leaves of the yew contain a principle which renders them poisonous was a fact well-known to the Greeks and Romans, although they were of course ignorant of the nature of it. The researches of modern chemistry show that there is an oleo-resin in them, which can further be split up into a volatile oil and an amorphous alkaloid, to which the name of *taxine* has been given. This oleo-resin is insoluble in water, hence the strained decoction of yew-leaves, or yew-tea, has no medicinal effect, although it is

frequently employed by ignorant quacks, herbalists, &c., in certain cases. As a proof of this I may intance a case recorded by Professor Redwood in the "Pharmaceutical Journal," Nov. 10, 1877, in which a woman took three half-teacupful doses of a strong decoction, without producing the slightest effect. Afterwards she took a similar dose, but with some chopped, unboiled leaves added. She died within three hours of the time of taking it. There have been other fatal cases to human beings from yew-leaves taken in a similar way, and several from the berries, as I will show further on.

In the majority of cases of accidental poisoning of animals from feeding on unwholesome food, the yew has been the cause of the mischief. Nor is this to be wondered at, considering the frequent use made of it for hedges, and the delicate, fresh appearance of the young shoots, offering at first an almost irresistible temptation to horses kept chiefly on dry fodder, and to oxen put upon short allowance. Some have said that the time of the year has an influence upon the effect of the leaves, but this opinion is probably due to the fact that, as a rule, animals only eat the yew where they can get nothing else. Others again have maintained that the Irish yew alone is poisonous; but this idea, apart from the comparative scarceness of the tree in this country, is negatived by the fact, that Professor Tuson, in a letter to the "Field" in January or February 1877, mentions finding English yew-leaves in the crops and gizzards of some pheasants, the cause of whose deaths he had been investigating. A very curious circumstance with regard to the yew may here be mentioned. In spite of its poisonous qualities it is given in Hanover and Hesse to cattle when fodder is scarce. At first it is mixed with the food in small quantities, gradually increased as the system becomes inured to it, until it forms the great bulk of the food. M. Husard, who noted this, tried the experiment on his return to France, but on the horse instead of on the ox. First he fed an emaciated, feeble horse with half-a-pound of yew and one pound and a half of oats, without the slightest bad effect. Then, thinking there might be a want of sensibility in the stomach of the first horse, he gave the same mixture to a mare in good health and condition, with the same result. Finally he gave seven ounces of yew, bruised and mixed with twelve ounces of water, to a horse which had fasted for some hours. This one died in an hour. Mr. Youatt, from whose work the above is taken, cautions people against using yew at all, as he had known instances in which the presence of a considerable quantity of other food in the stomach had not preserved the animal from the fatal effects of it.

In all properly recorded cases of poisoning by yew, both accidental and experimental, death takes place in one to three hours, apparently without much pain, if any. The proper remedies would be a free use of the stomach-pump, or four ounces of sweet-oil, in two doses, in warm ale, followed by a pint of strong salt and water.

With regard to poisoning by yew "berries," the truth appears to be this. The stone is poisonous—the pulp is not. In support of this assertion, I may be allowed to refer, in particular, to a fatal case at Oxford, which I communicated to the "Pharmaceutical Journal" (Nov. 15, 1879). The sufferer was a boy of nine years of age, who, with two sisters and a cousin, visited a cemetery, where they all plucked and ate several "berries," but the elder sister, in her evidence at the inquest, stated that the girls spat out the stones, while the boy, on the way home, "put a handful of berries into his mouth, and crunched them up and swallowed them, stones and all." He died in a short time.

The active principle, taxine, exists in the stones of the fruit, as well as in the leaves and bark, but it must be modified in some way occasionally. I suppose there is scarcely any one who has not eaten the soft flesh of the fruit, possibly even swallowed the stones, although without "crunching them up," as in the Oxford case, as they are very hard and bitter. This is probably the reason why there are so few recorded fatal poisoning cases from this cause. That the yew is poisonous, however, is a matter which admits of no doubt.

ROBERT MODLEN.

Gillingham, Chatham.

OLD ENGLISH PLANT-NAMES.

THE following plant-names have been taken from two old books on botany. I should be glad if any one could give any information how the older names originated, and whether they were general or local. The books are Lee's "Introduction to Botany," with a list of upwards of two thousand English names (London 1765); and Berkenhout's "Synopsis of Natural History," vol. ii. (1795). The letter B indicates which have been taken from Berkenhout. Another batch will be sent next month.

Old English Names.	Modern Synonyms.
Bay-loblolly.	Common St. John's wort.
Breakstone.	Saxifrage.
White sengreen, B.	Saxifrage (*S. granulata*).
Rape of cistus.	Asarum.
Chinquapin.	Common beech.
Coventry bell.	Canterbury bell.
Calf's-snout.	Common toadflax.
Cammock.	Restharrow.
Cheese rennet.	Crosswort (*G. verum*).
Podded corn violet, B.	Corn bellflower (*C. hybrida*).
Garter-tree or dog-berry, B.	Common cornel.

Old English Names.	Modern Synonyms.
Cornelian cherry.	Common cornel.
Ciboulis.	Common garlic.
Clown's all-heal, B.	*Stachys palustris.*
Cassidony.	Cudweed.
Christ's thorn.	Buckthorn.
Cockscomb.	Lousewort.
Cobnut.	Hazel.
Ashweed.	Common goutweed.
English mercury or allgood, B.	Goosefoot (*C. Bonus Henricus*).
Great caltrops, B.	Great pondweed.
Bugloss cowslip, B.	Broad-leaved lungwort.
Green blite, B.	Goosefoot (*C. viride*).
Calathian violet, B.	Marsh gentian.
Azarole.	Whitethorn.
Bachelor's pear.	Woody nightshade.
Bear's-ear.	Primrose.
Bitterwort.	Field gentian.
Blite.	Amaranthus.
Bloodwort.	Common dock.
Burning plant.	Common spurge.
Cardinal-flower.	Water lobelia.
Feathered columbine.	Common meadow-rue.
Costmary.	Tansy.
Cow's lungwort.	Great mullein.
Jerusalem cowslip.	Broad-leaved lungwort.

GEO. ROBERTS.

Lofthouse.

ON THE OCCURRENCE OF A THREAD-SPINNING ANNELID.

I FOUND what I supposed to be a kind of nais-worm upon the flat boarded roof of an out-house, through which, after rain, water percolated freely; the worm's movements were peculiar: it kept on gliding along the wet board for a few inches, and returning to the point from which it started; possibly the light of a candle may have alarmed the creature, as it darted to and fro as if in swimming, and apparently in defiance of gravity.

Desirous of knowing how the worm kept in position, I put it in a test tube with a few drops of water, and examined it next morning; it was about one inch and a half long, light red in colour, and somewhat translucent, the head was mandibular, and could be retracted, together with the first two segments, within the body, telescope-like; it had been employed over-night in lining the glass tube with silken threads, braced and attached in a very methodical way, so as to allow the inmate to move freely through the middle of the mesh, which formed a tunnel the length of the tube; the construction of this tunnel explained the facility with which the worm glided along the dripping roof.

I placed the whole arrangement under a low power, and watched the progress of the work. On the head protruding, the mouth was filled and distended with a clear viscous fluid; stretching forward, a drop resembling fluid marine glue in adhesiveness and consistency was attached to the side of the tube and drawn out into a thread; turning its head, the worm fastened the end held in its mandibles to the collar of the first segment of its body, and similarly drew out two other threads, which were united to the ends with the first, and then slipped down to the collar of the third segment, where they were held until the process was twice repeated and nine threads spun; grasping

Fig. 100.—Head and first three Segments of Thread-spinning Worm. × 50.

the ends of all the threads in its mandibles, it glued them in a point to one of the cables running the length of the tube: this process was continued until the glass tube became filled with the silken mesh.

Having satisfied myself as to the spinning powers of this annelid, I procured other examples, which were sent away for determination, but so far unsuccessfully. Probably the worm may not be uncommon; but the occurrence of a thread-spinning annelid was new to me, and I have failed so far in my inquiries to ascertain that this capability has hitherto been observed and recorded.

The last specimen obtained was a very small one, and broke in getting it from its mesh. The head was only $\frac{1}{25}$th of an inch across; but I dissected out the mandibles and photographed them—a print is enclosed together with a sketch from the microscope with the aid of a Beale's reflector. Although incomplete, the illustration may be an aid to identification; and I shall be glad to learn anything that is known concerning this humble artificer of silk.

M. H. ROBSON.

Newcastle-upon-Tyne.

GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

HOPS AND MORPHIA.—A. Landeberg, who has been working upon the extract of hops, tells us that hopeine is identical with morphine. Does this explain the popularity of hopetta, hop bitters, etc., among reclaimed inebriates and other "abstainers." It has long been known that hops supply, without fermentation, a stimulant, the exact composition and character of which has been a subject of some discussion among chemists.

If Landeberg is right, the more drowsy character of the intoxication produced by malt liquors as compared with wines is partly explained, as well as the general preference given to this particular bitter over any of the many substitutes that have been proposed and actually used in making beer.

HOP-STEMS AND FOLIAGE AS FOOD.—In the same number of the Chemical Society's "Journal" as that from which I derive the above is an abstract of a paper by Wein, on the feeding value of hop foliage, which he finds to closely approximate to the composition of meadow and clover hay and rye, and as regards percentage of nitrogenous nutritive material is not far behind wheat and rye bran. It is superior to ordinary green fodders. An important element of information is omitted in this abstract, viz., the age of the plants supplying the foliage upon which the experiments were made. As the age of the plant advances, its foliage becomes more and more woody, and the flower and seed in the course of their development rob the foliage of some of its nutritious material. I have tried the experiment of cooking the young shoots of hops after the manner of asparagus, and find that they make a very respectable substitute, provided they have not advanced too far. They are very good when from six to twelve inches high or thereabouts, and the leaves yet but partially developed. When, however, they are much further advanced, and the leaves are full-sized, the stem, instead of being tender and succulent, becomes fibrous, woody, and indigestible.

EFFECTS OF COLD ON MICROBES.—My old friend J. J. Coleman, to whom we are all so much indebted for the work he has done in overcoming the difficulties of preserving antipodean meat by freezing it economically, has, in conjunction with Professor J. G. McKendrick, made some interesting experiments on the effects of extreme cold on microbia, especially those concerned in transacting the business of putrefaction. The general result of these researches shows that the living developed organisms are killed by such reduction of temperature (80° to 120° below zero), while the germs retain their latent vitality. All the proceedings of these creatures—microphytes or microzoa—are suspended during the exposure to cold, but, on raising the temperature of the infusions containing them the germs become developed, and putrefaction proceeds by their agency.

FROGS AND THEIR ENEMIES.—The old stories, old pictures, and old stuffings, that represent battles between frogs and mice are justified by the observations of Mr. August Carter, of South Norwood, who has watched the pursuit of frogs by mice, the general result being that the frogs escape again and again after considerable shaking of their antagonists while held by them; at last, however, the wounds and frantic efforts of the frogs render them incapable of further effective resistance, and they become overpowered and partially eaten.

Few animals have more enemies than the frog. This is proved by the vast number of tadpoles that are hatched from the spawn of one mother, and which reach the stage of jumpers, but which somehow disappear, with the exception of a very small residuum. I have domesticated frogs in a large box or "froggery," having a basin of water in the centre let down to the level of a surrounding plain of turf. So long as they were liberally supplied with worms they lived together peacefully, grew rapidly, and all continued in robust health; but I found on my return after a summer vacation that their numbers were seriously diminished, and was unable at first to discover the enemy, until one day, while working near the froggery (it was in the laboratory of the Birmingham and Midland Institute), I heard a scream proceeding from it, and was greatly shocked at finding that the largest member of the family had caught one of the smallest by its hind-legs, and was proceeding to swallow it. The screams of the victim were cries of horror rather than of pain, as the cannibal had no biting teeth, and had not taken in more than half the length of the hind legs.

The demoralisation of the larger specimen was so complete that when I offered him the choice between a fat worm and a little frog he pursued the latter in preference. He ultimately expiated his crimes by becoming a martyr to science. Query—Was the depravity in this case due to artificial corruption, such as irregular feeding depending upon my presence

or absence, or is it inherent? If the latter, we may partly account for the rapid disappearance of the great broods of little frogs by parental voracity. I am told that the great prosperity of the Medical School of the University of Edinburgh has created a serious scarcity of frogs in the suburban districts of the Scottish metropolis.

THE CANALS OF MARS.—A few years ago (1881 and 1882) astronomers were puzzled by the announcement of a strange discovery by Schiaparelli, who stated that the planet Mars displayed, besides the polar snow-caps, the islands, peninsulas, seas, fjords, and continents previously observed, a number of canals or lines extending over great distances on the surface of the planet, mostly in parallel pairs, like exaggerated railways. As they had not been seen by other observers, and were still invisible to the majority, considerable doubts arose concerning their existence, especially as no physical explanation of their origin could be assigned without indulging the imagination very freely. At a recent meeting of the Academy of Sciences M. Faye announced that M. Perrotin and other observers at the Nice Observatory have redetected the canals of Schiaparelli. They appear to vary in shape and visibility with the seasons of the planet.

In describing the question of the reality of obscure telescopic details on the surfaces of planets, it should be always noted that the visibility of such faint markings depends far less upon the magnifying power of the telescope used than upon the definition; and as these markings are all more or less foggy and ghost-like, they are easily obliterated by very slight atmospheric obscuration. A mist which is itself invisible and insufficient to sensibly obscure a star may quite blot them out from sight.

It is a significant fact that Italian astronomers such as the two Cassinis, De Vico, Bianchini, etc., should long ago have described details on Venus and other planets, which Schröter confirmed, but which our English astronomers, with far better telescopes at a later date, could not detect. I have no doubt that the advantage of Italians and Germans was due to the superior clearness of the atmosphere in which themselves and their instruments were immersed.

I have discussed this question in chapter fifteen of "The Fuel of the Sun," which treats of the meteorology of the moon and the inferior planets, and here summarise an experience there described in detail. During a sojourn at Valetta, where, in accordance with Maltese custom, I spent many evenings on the house-roof, I found that the white summit of Mount Etna, a hundred miles distant, was just visible in very clear weather. It was only with great care, aided by familiarity with its shape, that this became possible with the naked eye. On using a small hand telescope it was lost. The difficulty of distinguishing it was not due to want of dimensions, nor want of light, but to the faint nebulous character of the outline, which differed so slightly from the surrounding haze of the horizon, which even there was sufficient to hide the cone in ordinary bright, cloudless, Mediterranean weather. Exceptional clearness, even of that sky, was required. It is doubtful whether, in our climate, such an object at such a distance could ever be seen. The features of the telescopic physiognomy of Mars, Venus and Mercury are similar in character to the outline of a snow-peak all but veiled in the sea-haze of an Italian summer horizon. The slight additional obscuration due to the imperfect transparency of the telescope lenses was the last optical straw that broke down the possibilities of vision in the case of Mount Etna.

THE THREE CONDITIONS OF MATTER.—Oxygen has now been distinctly solidified. Professor Dewar has completely succeeded in obtaining it in the form of snow at a temperature of 200° below zero centigrade, or 360° below zero Fahrenheit. We may now safely assert the generalisation which was formerly but speculative, viz. that all elementary matter may exist in either of the three conditions, of solid, liquid, or gas, and that these conditions simply depend upon temperature and pressure. I say "elementary matter," because the case of compounds is different. Many, such as water, are familiarly known in all the three states, but others become dissociated; their elements are driven apart by heat at a lower temperature than that which is necessary for vaporising them. Sugar, for example, is readily fused into a liquid by heat, but if we attempt to volatilise it we find that it darkens in colour, and finally becomes a black carbonaceous cinder. Sugar is one of the carbohydrates, or compounds of carbon and water; the heat drives off the water as steam, and leaves the carbon behind.

The fixed oils are similarly dissociated, but in this case only just before they arrive at their boiling-point. Some of these may, however, be distilled without decomposition, by heating them under diminished atmospheric pressure.

STROH'S NEW STEREOSCOPE.—Many years ago, when the stereoscope was a novelty, I tried some vain experiments for the purpose of obtaining a stereoscopic picture on a screen by various methods of superposing right and left eye stereoscopic photographs Others have probably attempted the same, and have similarly failed. On the 1st of April (a date that would have been quite appropriate for my experiments) a new form of stereoscope was described to the Royal Society by A. Stroh. His apparatus, like mine, consisted primarily of two dissolving-view lanterns placed side by side, by means of which he superimposed the two pictures on a screen. In front of his lantern lenses is a rotating disc, portions of which are cut away, so that during its rotation it obscures the light

of each lantern alternately, and thus, when this operates, only one picture is thrown on the screen at one time. The operator is provided with a pair of eye-holes, with a similar disc that similarly effects an alternating obstruction of the view from the right and left eye. This is so arranged that by its rotation the obscuration of the right and left eye-holes shall coincide with the obscuration of the right and left lens of the lantern. Thus the spectator only sees the left lantern picture with the left eye, and the right picture with the right eye. By making the rotation so rapid that the impression on the retina of one eye remains when the other picture is presented to the other eye, the now understood conditions of stereoscopy are fulfilled, and the spectator sees a magnified stereoscopic picture.

In the arrangement at present constructed only two persons can view the screen simultaneously, one on each side of the lanterns, as the same apparatus works the lens shutters and the two pairs of eye-blinkers. In spite of my own failure, I have always looked forward to the ultimate achievement of the attempt; and, seeing that this arrangement of Mr. Stroh is but an infant, we may fairly hope for its development, and expect that in the Polytechnic of the future we shall be able to sit in an optical theatre suitably provided with watch-work blinkers, and contemplate photographed interiors and landscapes having actual stereoscopic perspective, and thus presenting representations of reality such as no flat picture can approach—a consummation most devoutly to be wished for.

THE STEREOGRAMS OF THE LATE MR. CHARLES BREESE.—In connection with the above subject, I am able to supply some information concerning stereographic pictures that may be new and interesting to amateur photographers. It is generally supposed that instantaneous photography is a recent invention. This, however, is not the case. More than thirty years ago Mr. Charles Breese obtained instantaneous pictures of breaking waves, seagulls on the wing, and other similar objects. These pictures still remain unsurpassed. They were in stereoscopic pairs, forming what he properly styled "stereograms." They were printed on glass and shown at many exhibitions. He sold them at high prices, as much as two guineas per stereogram, and kept his process a close secret. I knew him well. He was a genuine artist, an ingenious inventor, and a successful student of science. The permanency of his pictures has been questioned. In reply to this, I may state that he gave me a series as a wedding present twenty-seven years ago, and they now remain as fresh as they then were. After his death I purchased from his executors all the slides that remained, nearly a thousand, of different degrees of merit. I sold many of them to the opticians, from whom a few are still obtainable, and I have some left. Besides their merit as instantaneous pictures they have another, viz. remarkable atmospheric perspective. This has been obtained by skilful combination of pictures from two negatives, the clouds and sky on one, the landscape or sea on the other. At the time when he was actively operating nobody else could do this with similar effect in stereoscopic pictures, but I do not know whether it has since been achieved.

His instantaneous photography of the moon and a portrait of his sister, taken by moonlight, were subjects of rather acrid discussion at the time. One was described as "a painted moon," and he was denounced as an impostor by certain self-sufficient photographers, who assumed that what themselves were incapable of doing were impossibilities. He did obtain besides these, and quite differently, certain moonlight effects by skilful combination of landscape and cloud pictures. I still have many of these, and regard them as works of great merit, combining artistic with photographic skill, which our modern photographers would do well to emulate.

HABITS OF THE BANK-VOLE.

THE fact, that an abundant mammalian fauna is totally incompatible with a large human population, and a high state of civilisation, is I fear, indisputable; but at the same time it can hardly fail to be a subject of regret to many. As man and his works spread abroad over the face of the globe, the native quadrupeds (excepting those species directly beneficial to him) gradually but surely disappear before him. Here in Great Britain, for instance, this state of things is only too apparent: what with the destruction of forests, the enclosure and cultivation of waste lands of all descriptions, the increasing area devoted to building operations, and the modern clean system of farming, with its small trim fences few and far between, not to speak of the terrible and often unnecessary destruction wrought by gamekeepers among so-called vermin, our short list of British quadrupeds is slowly but surely becoming shorter. There yet remain, however, a few species, notably among the Shrews (Sorex) and the Voles (Arvicola), whose habits and manner of life have never been fully investigated, and whose very existence, even where tolerably abundant, often remains almost unnoticed and unsuspected. This arises, in some measure, from their nocturnal and burrowing habits, their small size, and the consequent ease with which they are able to conceal themselves among grass and herbage of various kinds. The sober though pleasing tints of their fur often assimilate too very closely with that of their surroundings, a fact particularly noticeable in the Voles (Arvicola), who feed and move about a good deal by day as well as night, and are thus more in need of such a means of protection than animals of more strictly nocturnal habits. How

often does the water-rat (*A. amphibius*) entirely escape the observation of the passer-by, as it sits motionless on the wet mud at only a few yards distance; its startling plunge into the sheltering element alone betraying its presence, so nearly does its colouring match that of the muddy banks of the stream. Almost equally well does the warm reddish fur of the pretty little bank-vole (*A. rufescens*, De Selys), the subject of the present sketch, melt away imperceptibly into a background of crumbling earth and dead leaves, thrown here and there into shadow by projecting rootlets, ivy leaves and dead grasses. Of the three British voles, the present species, from its comparative scarcity, or more strictly speaking perhaps from it being less frequently met with than the others, has received the smallest share of attention. On the Continent, however, it is well known, and is found in various parts. So remarkably retiring and unobtrusive indeed are the habits of this little creature that it may and probably does exist in much greater numbers than is generally supposed. The first intimation I received of its occurrence here was from seeing a cat playing with one. Since then I have found it to be far from uncommon in this neighbourhood in suitable spots, and for years have caught and kept specimens by me. Their favourite haunts here are old rough ivy-covered hedge-banks, especially those from which the soil has been washed away in places, leaving the roots bare, and thus forming hollows behind them; banks adjoining woods and plantations seem particularly attractive to them. In spots like this, pleasingly varied by a sprinkling of old mossy stubs, brambles and bushes, with the roots of overhanging trees backed by deep cavernous recesses, the bank-vole makes its burrow, and forms runs in all directions, partly above and partly below the surface, probably also making use of those of the mole. I have caught them too among artificial rockwork, and in a plantation in which are banks thickly covered with the lesser periwinkle, among the roots and stems of which they had formed numerous runs. Externally this species is at once distinguished from the short-tailed field-mouse (*A. agrestis*), so common in meadows and pasture-land generally, by its larger ears, longer tail, and colour, it is also smaller, as well as proportionately less bulky and more elongated in form. The description and dimensions given by Lord Clermont in his "Quadrupeds and Reptiles of Europe," is as follows: "Tail rather more than half the length of the body, covered with short hairs, blackish above, yellowish-white beneath, concealing the scaly rings, which are about ninety in number; ears rather large, slighty oval, longer than the fur, furnished with small reddish hairs; eyes prominent, but less so than in *A. arvalis*; feet dirty white. Fur on the upper parts of the body rusty red, ash-grey on the sides, more or less bright according to the season, the hair being tipped with blackish; under parts whitish, tinged with bright red-brown when in a perfect state. In young animals this red colour appears strongly only on the top of the head and on the middle of the back, the rest of the upper part of the body being largely mingled with dark ash; has 13 pairs of ribs. Length of head and body, 3 inches 2 lines; head, 1 inch; ears, 5 lines; tail, 1 inch 11 lines." The above dimensions are stated by the author to be given in old French measure, 1 foot being equivalent to 1 foot 1 inch and 1½ lines English. Of nine adults from this immediate neighbourhood the average dimensions were head and body rather over 3 inches 8 lines, tail 1 inch 9 lines; one example, a female, measured as much as 4 inches in head and body, tail 1 inch 9 lines. The bright fawn or orange tint observable on the under parts of some specimens varies a good deal in intensity, being sometimes altogether absent. Not only do these little animals make pleasing and interesting pets, but they also thrive remarkably well in confinement. On more than one occasion indeed, on placing a fresh-caught specimen with the former occupants of a cage, I have been struck with the superior plumpness and sleekness of the latter; I may also add that I have never had one die in captivity. A female caught here in January 1883 was exceedingly fond of bread, and would often carry a large piece up a ladder to her sleeping-place; in fact I have always found them prefer bread and grass to any other food, and this has generally been the staple diet of those I have kept. In captivity they will also eat haws, peas, nuts, apples and hemp-seed; of maize, like the tits (Paridæ), they only devour the middle, rejecting the greater part of the grain; their fondness for the seeds of the sunflower is another taste they share with those birds. In addition to grasses, they probably feed in the wild state upon the leaves of various other plants, but the following are all that I can vouch for with absolute certainty: sheep's parsley, common plantain, Brussels sprouts and hog-weed. They are able to bite through the shell of most filberts, but I doubt whether that of the hazel-nut would not prove too much for their gnawing powers. Several times during March 1884 I pegged down apples in the runs of these animals, but in no instance were they bitten, though, as stated above, they eagerly devour them in captivity. The stomach of a specimen, caught during the month of July 1884 by a cat, contained a mass of partially digested matter, consisting apparently of small seeds (resembling those of grasses), rather that of leaves and blades of grass. Victor Fatio, in his "Faune des Vertébrés de la Suisse," states that during the winter the bank-vole subsists on bark and roots; he also affirms that, in addition to its usual vegetable diet, it also devours worms, and is in the habit of robbing the nests of small birds building on or near the ground. This taste for animal food and insects has been observed on various occasions in its congener the short-tailed

field-mouse, and the water-rat has also been accused of occasionally exhibiting similar tastes. There can however be little doubt but that by far the greater proportion of the food of all three species is of a vegetable nature. When angry these little creatures make a great fuss, grinding their teeth and using their voice very freely, which may be described as a short grunting squeak, neither so sharp nor so prolonged as that of *Mus sylvaticus* or *musculus*. In quarrelling their actions are ludicrous in the extreme: they dodge round each other in a perfectly upright attitude, hopping on their hind legs, and now and then nearly throwing themselves over backwards in endeavouring to avoid each other's attacks, the fore-paws being held stretched out before the face for protection. There is a great deal of fuss, and much squeaking and grinding of teeth, but very little comes of it all, and in general they are peaceable and gentle in their ways. They are remarkably quick and active in their movements, the usual manner of progression being a succession of short jerky runs, very bird-like in character, and not unlike the action of the hedge-sparrow when on the ground. They are most expert climbers, and quite at home among the branches and twigs of hedges and bushes. Many years before I had become personally acquainted with the appearance and habits of this pretty and interesting little animal, I saw what I have now little doubt was a bank-vole, climbing about in a whitethorn fence in this parish, probably in search of haws. (Dormice do not occur here.) Last summer I kept three bank-voles with a pair of dormice in a very large bell glass, having a superstructure of wire gauze in which a rough bush was fixed for them to climb about on: this they often made use of, and ran up and down with almost as much agility as their companions; but they evidently lack the power of jumping long distances from branch to branch, possessed in such perfection by the squirrels and dormice. A female killed by a cat, July 4th, 1884, contained five young, which to all appearance would have been born almost immediately; probably, however, this species breeds much earlier in the year than this, and, like *A. agrestis*, has several litters during the spring and summer mouths. According to the writer last quoted, they breed from twice to four times, producing from four to eight in a litter. A word as to traps may be acceptable to some of your readers. I have caught bank-voles in various kinds of traps, but have found nothing answer better than a larger make of the common (live) mousetrap with a slanting door. If the usual small-sized penny trap be used, the bait-hook must be shifted one wire farther from the mouth, so as to give greater length to the trap, otherwise the hind-quarters of the captive will be crushed by the falling door; but even with this alteration the trap is not large enough, and it is far better to use a bigger one. There is a useful trap for this purpose in form somewhat like a toast-rack, with a small wire falling door at each end, the floor being of wood; one advantage of which is that it may be easily covered up and kept dry and warm, should the night prove wet or frosty; in which case the little prisoner would (without such protection) almost certainly be found in a few hours dead and stiff. For bait nothing is better than a crust of bread; a soaked pea or even a bit of cheese will also be found attractive. A very few hempseeds scattered about the entrance of the trap serve as a useful ground-bait.

Fig. 101.—The Bank-Vole (*Arvicola rufescens*, De Selys, *pratensis*, Baillon).

G. T. Rope.

Blaxhall, Suffolk.

ENTOMOLOGICAL LITERATURE.

(MUFFET'S *THEATRUM INSECTORUM.*)

[*Continued from p.* 52.]

SUCH was the state of Entomological Literature when Oxford University produced a learned student of Nature, and more particularly of the branch in which we are specially interested—Dr. Moufet or Muffet. This Dr. Muffet (to quote Anthony Wood in his "Athenæ Oxonienses,") was "educated in this University"—*i.e.* Oxford—"and afterwards travelled into divers countries in Europe, where he became known to the most eminent physicians and chymists of that time, and was doctorated in physic in some noted university in his travels. . . . He became much honoured and beloved by Peregrine Bertie, Lord Willoughbie of Eresbie, and esteemed the famous ornament of the body of physicians, and the true pattern of all polite and solid literature," &c. Such was the man who, far from despising Entomology, not only deemed it worthy of his attention, but even made it the favourite study of his life. Dr. Muffet wrote several books,* but his greatest achievement was undoubtedly his "*Theatrum insectorum.*" This work he probably commenced during his travels on the continent, where, at the different Universities, he would have access to the numerous books he consulted; and, as Wood says, he became intimate with the most scientific men of his time. I have enumerated above all the notices of insects now generally known to exist in printed books at that period; but Muffet in his book gives a list of 406 authors whose writings he had consulted in compiling his own work. Many of them I find to be medical writers who rank certain insects among their Materia Medica, or on the other hand give recipes for the cure of the baneful effects caused by bites and stings; others, again are names of well-known classical authors—Greek and Latin—who draw similes from insects and their economy; but of a great number I can find no mention, and I suppose we may conclude that they were possibly only MSS., which have since perished, with the names of their authors also.

I must now digress a little to follow the vicissitudes of Conrad Gesner's papers on Entomology. I mentioned them above as having been purchased at his death by Joachim Kamerarius, and afterwards falling into the hands of Dr. Wotton, who sent them to a publisher in London named Thomas Penn, also a great student of Nature, and an observer of insects in particular. For some reason or other Penn did not fulfil his commission, and at his death these poor knocked-about papers fell into the hands of Dr. Muffet, who purchased them along with some other MSS. by Dr. Wotton and T. Penn, to incorporate with his "Theatrum." We thus see that Thomas Muffet's book contains the writings of Gesner, Wotton, and Penn, which he weaves together into a tangible form, adding and correcting from the authors, whose names he enumerates at the commencement of his work; in addition to these, his own observations and those of certain entomological friends he seems to have had, form no small part of the contents. Soon after completing this work, Dr. Muffet seems to have died, leaving it in MS., in which state it lay for many years almost forgotten.

Meanwhile, while Muffet had been writing his book, and after his death, numerous other publications appeared, containing more or less brief accounts of insects. These may be divided in the same manner as before, to guide us in our search. In the first class—books on medicine—we find insects mentioned by Bauhin, who in 1598 published a "History of the wonderful Medicinal Spring in the Duchy of Wirtemburg, with many Figures of various Insects found in the Neighbourhood."* This Bauhin obtained his greatest fame as a botanist; he and his brother are said to have laboured for forty years for the advancement of that science. In the same class of books, insects are casually treated of by Laurent Catelan, a chemist of Montpellier,† by Angelinus,‡ and by Bertaldi.§ Theodosius also, a learned doctor, in his "Letters on Medicine," devotes one to Glow-worms.‖ The second class, which contains histories of countries, includes Castaqueda's large "History of Oriental India,"¶ which mentions certain insects, and Schwenkfeld's "Theriotrophium"** in which, according to the title, the "nature and use of certain animals, birds, insects, &c., are set forth." In the class in which we rank works on Natural History in general—No. 3—we find several treatises appearing about this time. The first in chronological order is the work of Scaliger,†† in fifteen books, which

* De jure et praestantia Chymicorum medicamentorum dialogus Apologeticus, Francof. 1584; Ursell, 1602. Epistolæ quinque medicinales (printed with 1602 edition of last work). Nosomantica Hippocratea; sive, &c. &c., Franc., 1598 (in nine books). Health's Improvement: or Rules comprising and discovering the nature, method, and manner of preparing all sorts of Food used in the Nation; 4to, London, 1655. De Anodinis Medicamentis Theses in medica, Basilicus propositae; Basil, 1578.

* Historia admirabilis fontis Bollensis, in ducato Wirtenburgico, cum plurimis figuris variorum Insectorum quae in et circa hanc fontem reperiuntur; in 4to, Montisbeligardi, 1598; in German, in 4to, Stutgarten, 1602. He also mentions insects in De aquis medicatis nova methodus, in 4to, Mont., 1605-7-12; and a book with no other title than "Vivitur Ingenio caetera mortis erunt" treats of insects and plants.

† Démonstration des ingrédients qui entrent dans la confection de l'Alchermes; in 12mo, Montpel., 1609 and 1614.

‡ De verme admirando per nares egresso; Ravenae, 1610.

§ Confectio de Hyacintho et confectio alchermes, in 4to, Taurinii, 1613-19.

‖ "De Lampyridæ" in his Epistol. Medic., ep. 59, p. 305; in 8vo, Bale, 1553. He also mentions insects in an epistle, "Quid sit Verticellus, Polypus, Cochlea. Spondylus," Epistol. Medic., ep. 17, p. 48.

¶ Historia dell' Indie orientali (translated from the Spanish by A. Ylloa), 7 vols. 4to, Venezia, 1578.

** Theriotropheum Silesiæ, in quo animalium, quadrupedum, reptilium, avium, piscium, insectorum natura, vis et usus sex libris perstringuntur; 4to, Lignicii, 1603 and 1604.

†† Exoticarum exercitationum liber xv. de subtilitate H. Cardan; in 4to, Paris, 1557; 8vo, Bâle, 1560, &c. (often reprinted); "De Cantharidibus"—de sub. ex. 184, p. 605; "De Apibus, Bombycibus et melle vesparum"—de sub. ex. 191, p. 623; "De Locustis"—de sub. ex. 192, p. 625.

contains cantharides, bees, silkworms, and locusts. Next comes the large folio Nat. Hist. of Ferrante Imperato,* and the same year we find that most important work on the same subject by Ulysses Aldrovandus published in folio at Bologna.† Vol. iv. of this tremendous achievement, which appeared A.D. 1604, contains seven books on insects, which recapitulate all that had previously been written on the subject; the letter-press is supplemented by very numerous illustrations, making it altogether a most important production—not, however, a separate publication like Muffet's, but merely a single volume of a more comprehensive work. In the year 1605 Clusius (who as we gather from hints in Muffet's "Theatrum," was no mean entomologist, and himself a personal friend of Muffet's) published a "History of Exotic Animals and Plants."‡ This author, whose descriptions are remarkable for exactness and elegance, is most generally known to the scientific world as the delineator, in the work mentioned above, of that curious and now extinct bird, the Dodo. In 1616 we find a large folio by Columna, called "Observations on certain Aquatic and Terrestrial Animals,"§ in which one chapter treats of the glow-worm, and two others of beetles, while the second part is devoted to caterpillars.‖ The last work of this class we have to notice is Archibald Simson's quarto, published at Edinburgh A.D. 1622, purporting to be a "History of all the Animal Creation, including Insects, found in the Holy Scriptures."¶

W. GARDNER.

ASTRONOMY AND METEOROLOGY.

By JOHN BROWNING, F.R.A.S.

AT the meeting of the Royal Astronomical Society, held on May 14, Colonel Tupman exhibited an engraving showing the new nebulæ in the Pleiades, made from photographs by the brothers Henry, and also a number of exquisite photographs of the planet Jupiter, showing the red spot, and the details of the dark belts.

Mr. H. Grubb described a working model of an observatory and equatorial mounting which he had contrived for the 36-inch achromatic telescope of the Lick Observatory in California.

On entering the Observatory the observer will pick up a small instrument attached to a rope of insulated wires. It contains nine contact keys, and is made to fold like a book, so that it can be put in the observer's pocket. By touching the first key the observer lights up the building with electric lights. By pressing the second key he moves the dome, and at the same time opens the shutter, which can, by a contrivance under the control of the observer, be anchored to the wall of the observatory, so that when the dome is moved the shutter is pulled open. The motion is produced by means of a water-engine, the valves of which are opened and shut by a piece of mechanism which must be wound up every day by an assistant, and this apparatus can be set in motion or stopped by means of electro-magnets. By pressing another key the observer can move the telescope in R.A., and a fourth enables him to move it in declination. The observer then has to bring himself into a position to observe. The dome of the Lick Observatory will be 70 feet in internal diameter. Instead of making the observer climb into an observing chair, which would require to be 25 feet high, and would be very heavy to move, he presses a key which causes the whole floor to move up or down, so that the observer can be brought up to within a few feet of the level of the eye-piece, and can comfortably sit on a low chair without fear of falling or accident. The machinery which would raise the floor of the Lick Observatory would be made strong enough to allow of a ton and a-half of observers being carried up with it. Such a force might do some damage if the wrong key were touched, and the floor went up while the observer had his eye at the eye-piece. Mr. Grubb proposes to provide against such an accident by hanging a weight near to the eye end of the telescope, which, when it touches the floor, will instantly cut off the water supply.

Dr. Leonard Waldo, of Yale, described a new escapement for astronomical clocks.

The Astronomer Royal has issued his annual report to the Board of Visitors, which gives an account of the work done in the Observatory during the year terminating on the 20th of May. In this report, among other interesting facts, he states that the instrument for determining absolute personal equations was completed last autumn, and several series of observations have been taken with it; the results were very satisfactory (the accordance being as close as could be expected), and seem to show that all the observers observe in the direction of being somewhat too late.

The spectroscopic observations include a considerable number made of the new star which burst out last August in the great nebula of Andromeda. Measurements for the determination of the motion of stars in the line of sight were continuously carried on. Photographs of the sun were taken on 205 days. By interpolating in the Greenwich series photographs obtained in India and the Mauritius, photographs were recorded in the year 1885 on 360 days.

* Dell' Historia Naturale libri 28; in fol., Napoli, 1599, and other editions.
† Historia Naturalis, 13 vols. in fol. Bunoniæ, 1599, and following years (best edition); in fol. Bunon., 1602; in fol. Franckfort, 1623; in fol. Bunon., 1638.
‡ Exoticarium libri decem quibus animalium, plantarum, etc., historiæ describuntur; in fol. Antverpiæ, 1605.
§ Aquatilium et terrestrium, aliquot; animalium aliorumque naturalium rerum observationes (with figures), in 4to, Romæ, 1686.
‖ Eruca rutacea ejusque Chrysalidis et Papilionis observationes.
¶ Hieroglyphica animalium atque insectorum qui scripturis sacris inveniuntur, in 4to.

Referring to the meteorological observations, the mean temperature of the year 1885 was 48° 6′ being 0° 7′ lower than the average for the preceding forty-four years. The highest temperature in the shade was 90° 2′ on August the 26th, and the lowest 22° 3′ on January the 22nd. The rainfall for 1885 amounted to 24 inches, being 0·8 inch below the average for the preceding forty-four years.

A new achromatic telescope, with an object-glass 28 inches in diameter, has been commenced, and an arrangement is being made for using the 12$\frac{3}{4}$-inch refractor for taking photographs of astronomical objects.

In July Mercury will be an evening star, and Venus a morning star.

On July 2nd the earth will be at the greatest distance from the sun at 4 P.M.

There will be no occulations of any stars above the fourth magnitude.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
MERCURY ☿	2	5 31M	1 34A	9 37A
	9	6 7M	1 49A	9 31A
	16	6 34M	1 54A	9 14A
	23	6 50M	1 50A	8 50A
	30	6 47M	1 33A	8 19A
VENUS ♀	2	1 37M	9 22M	5 7A
	9	1 34M	9 29M	5 24A
	16	1 32M	9 36M	5 40A
	23	1 35M	9 44M	5 53A
	30	1 42M	9 52M	6 2A
MARS ♂	2	11 15M	5 20A	11 25A
	9	11 10M	5 6A	11 2A
	16	11 5M	4 52A	10 39A
	23	11 0M	4 39A	10 18A
	30	10 55M	4 26A	9 57A
JUPITER ♃	2	11 0M	5 13A	11 26A
	9	10 38M	4 49A	11 0A
	16	10 16M	4 25A	10 34A
	23	9 54M	4 1A	10 8A
	30	9 32M	3 37A	9 42A
SATURN ♄	2	3 59M	0 9A	8 19A
	9	3 36M	11 46M	7 56A
	16	3 12M	11 22M	7 32A
	23	2 49M	10 58M	7 7A
	30	2 27M	10 35M	6 43A

Meteorology.—In the five weeks from the 8th of May to the 12th of June the mean temperature of the air was 54° 3′, about 5 degrees below the average.

Rain fell on nineteen days to the aggregate amount of 4·47 inches, that is, about 458 tons to each acre; more than double the average.

The mean temperature of the air in July is 64° for London and the vicinity. On the south and east coasts it is 63°, and on the west coast it is only between 61° and 62°, the lower temperature being due to the cooling action of the sea.

The mean rainfall for the east and south from Norfolk to Dorset is 2 inches; on nearly the whole of the west coast the rainfall averages 3 inches.

LEPIDOPTERISTS' WORK FOR JULY.

By W. Finch, jun.

In this glorious month the work cut out for us is such as to preclude all possibility of a single pair of hands accomplishing it successfully and thoroughly. However, we will do our utmost to get through as much as we can. The means of capture are the same as in last month, but perhaps a little advice as to the best method of applying these means will not be out of place. During the past month I have received many letters, asking advice on various subjects, which I will endeavour to fully explain when the time comes for them to be put into operation.

In searching for ova, proceed as directed last month. In hatching these always damp them slightly towards the time when they are expected to hatch. This is a great boon to the embryo larvæ, making their exit from the shell an easy matter; otherwise the shell is often so dry and hard that the little larvæ are unable to emerge. A friend has lost many valuable larvæ of exotic insects in this way this season. Never place ova in the hot sunshine to hatch as it is invariably fatal to the embryo within. For larvæ, beating and sweeping will be productive. An open umbrella held under a bush, and the latter well shaken or beaten over it, is about as good a way as any for procuring geometers, etc. In searching for larvæ on larger trees, the collector will do well to get underneath the branches, when on viewing the foliage against the sky, any larvæ will be immediately seen by their shadows on the leaves. A good length of stout twine with a leaden weight at one end is very useful for bringing high branches down within reach. Do not overcrowd your cages this hot weather, or disease and death will surely result. A small lump of quicklime contained in a gauze-covered jar is very desirable to keep down the moisture. This when reduced to powder, will of course require to be renewed.

In the hedges will now be found the large white webs of *E. lacustris*, teeming with larvæ, which are very handsome in the last stage, and preserve admirably. It is astonishing how few of the perfect insects there are seen after the advent of these hordes of larvæ. Not one half of these larvæ attain to maturity or spin up. I have had them year after year, thousands of them, and the majority perished from no apparent cause, when nearly full fed. If it were not for this wise provision, how we should be overrun with them!

Many larvæ will not thrive on cut branches when kept in water; the moisture in the foliage seems too much for them. Such larvæ will feed and grow rapidly up to the last stage, and then they unaccountably die. They should be fed on growing trees if possible, if not, on cut branches kept dry; these may be kept fresh much longer than usual if the cut end be sealed over with wax. The families of Vanessa and Catocala, and often Dicranura, are subject to the above. But experience alone will teach the tyro which larvæ this mode of feeding affects.

Let pupæ alone altogether this month. It will be as well, for there is too much else to be done. With regard to the proper way to keep pupæ; the natural way is the proper one. Let them take their own course when in the larvæ state, and they will provide much better accommodation than you ever can. This of course applies to those that spin, and also to the butterfly chrysalids. Subterranean pupæ will be treated of later on.

Now as to imagos. Many and varied are the methods of taking these, the perfect insects; those recommended last month are equally applicable to this. The mainstay this month however, will be the net by day, and the treacle-pot by night. It is a magnificent sight to see forty or fifty fine insects fighting and struggling on a space of six or seven inches or more, their eyes reflecting the light of the lantern like so many stars. A word here as to the preparation of this "bait." The following mixture I have always found the best, and moreover it is easily made: Half a pound of common treacle (not golden syrup), a wineglassful of commonest rum, and three or four drops of oil of aniseed; brush on the tree thinly, in a streak about a foot long by two inches wide; let it be about as high as your head, it will be all the easier to get at. I always strap the lantern on to my hat. Some collectors recommend a net shaped so as to fit round the trunk of the tree, to be held just below the treacle-spot. To an "expert hand" I need scarcely say this is unnecessary. Turn the light on at the foot of the tree and gradually raise it up to the treacle. If flashed too suddenly on to the moths, they will dart off in alarm—that is, of course, the good ones; the commoner moths do not seem to mind it so much. "Light," too, may be advantageously used this month. Do not, however, be so foolish as to purchase so-called "moth-traps," which are merely an invention to benefit the inventor, and not the person who buys one. In a country place, put a candle in the bedroom window, or a lamp, and then go to bed. Of course you leave the window open. On rising in the morning you will find the moths your light has attracted, on the ceiling or walls. A white sheet hung up in the woods or fields, and a lamp placed behind it, will attract a wonderful number of insects. The same minus the lamp, will also prove an attraction in the daytime, while doorsteps, white stones, etc., will often be found to attract insects.

During this month, too, that glorious fellow the purple emperor (*Apatura iris*) is on the wing. To secure him as he flies around the topmost branches of the oak-trees a very long rod is needed to the net; and even then he easily eludes the net, for he is very swift. However, we may take advantage of a little weakness of his to secure him; he is very fond of fœtid matter, and a dead animal in an advanced state of putrefaction will assuredly bring him down, when with care he may be netted.

Thatch-beating may be resumed this month. The tops or heads of rushes will often be swarming with moths about ten o'clock at night, and should be well looked after. Stone walls covered with lichen will produce many pretty insects if closely scanned. *B. perla* and *B. glandifera* may thus be found.

158, *Arkwright Street, Nottingham.*

SCIENCE DIRECTORY.

EASTBOURNE Natural History Society. President, Rev. W. A. St. John Dearsley, M.A.; Hon. Secretary, F. G. Cooke, Esq., 6 Trinity Buildings, Seaside Road, Eastbourne.

Leys Natural History and Science Society (including Meteorological, Chemical, and Astronomical branches); President, C. W. Kimmins, Esq., B.A., B.Sc.; Hon. Secretary, Philip H. Hadfield. Weekly lectures are held each Saturday during the winter, and excursions are held during summer.

Middlesex Natural History Society and Field Club. President, the Rt. Hon. Viscount Enfield, Lord Lieutenant of Middlesex; Hon. Secretary and Treasurer, Sidney T. Klein, F.R.A.S.

Sheffield Literary and Philosophical Society. Officers for 1886:—President, Charles Belk, Esq; Secretaries, Messrs. Edward Birks and H. C. Sorby, LL.D. &c.; Librarian, Mr. D. Parkes.

SCIENCE-GOSSIP.

THAT the metropolitan county should have been so long and exceptionally without a natural history society is curious. This anomaly is, however, now removed. A Middlesex county society has been formally constituted, of which Lord Enfield has been elected president.

MR. A. STROH has described before the Royal Society a new form of stereoscope, which can enlarge pictures to such an extent as to appear equal to, or even larger than, the original objects from which they were taken.

MR. W. BALDWIN SPENCER has minutely figured and described in "Nature" the parietal eye of the

remarkable New Zealand lizard, *Hatteria punctata*. It is embedded in the substance occupying the parietal foramen. This is an illustration in the same animal of the invertebrate as well as the vertebrate type of eye.

M. CHEVREUL, the distinguished French physicist, has been honoured by the Paris Academy by the formal "homage" of the members, on the completion of the one hundredth year of his age.

AT the recent Royal Society's conversazione, Mr. Caldwell exhibited a complete series of embryological specimens of the Australian mud-fish (Ceratodus) from the unsegmented egg to hatching; also early stages in the development of the platypus and Echidna, as well as of such marsupials as Phascolarctos and Halmaturus.

WE are sorry to have to record the death of Dr. T. R. Lewis, the author of various papers published in the "Quarterly Journal of Microscopical Science," as well as in SCIENCE-GOSSIP. He was one of the first to institute the modern method of investigation of Bacteria, etc.

MOUNT ETNA has been in a state of intense eruption, and the city of Nicolosi has been threatened with destruction by the descending lava-streams.

THE Great Eastern Railway Co. have very wisely reprinted the various articles which are scattered through magazines and newspapers relating to the character of the country through which their lines pass. No more agreeable nooks and corners for botanists, geologists, or entomologists can be found in England than in the Eastern Counties.

WE have received a copy of Bright's "Guide to Bournemouth," edited by Mr. C. H. Octavius Curtis, F.S.A. Many naturalists visit this well-known locality, and to such the capitally got-up descriptions and lists of the fauna, flora, and geology of the district will be very welcome.

WE are pleased to notice from the report of the Albany Museum (Cape of Good Hope) for 1885 that a most valuable series of the zoological, geological, mineralogical, etc., productions of the colony are being gathered together, thanks to the generous donations of the colonists. The report is admirably drawn up by M. Glanville, the Curator of the Museum.

"THE MEDICAL ANNUAL," for 1886 (by Dr. Percy Wilde), contains a review of popular and general science for last year, written by Dr. J. E. Taylor, F.L.S., etc.; also a review of the therapeutics of the year, by Dr. W. Wynn Westcott; a review of the New British Pharmacopœia, by the same author; papers on, "Abdominal Surgery," by Mr. J. W. Taylor; Skin Diseases, by Dr. Tom Robinson; retrospect of psychological medicine for the year, by Dr. P. Jones; "Midwifery," by Dr. H. Pye Smith, etc.

MR. J. W. OLIVER has compiled a very useful little pamphlet, called "Synopsis of the Natural Orders of British Flowering Plants."

FROM the Rev. H. W. Lett, M.A., we have received a reprint of his valuable paper (published in the Proceedings of the Belfast Naturalists' Field Club) on "The Fungi of the North of Ireland," in which he enumerates 581 species and assigns their localities.

AMONG the useful publications of the Calcutta Public Health Society a capital and very readable paper has just appeared, by Mr. W. J. Simmons, entitled "Air, Water, and Soil, as affecting Health."

NOS. 73 and 74 of Mr. William Wesley's "Natural History and Scientific Book Circular" are to hand.

MR. L. UPCOTT GILL has just published the ninth annual little volume on "Bicycles and Tricycles," for 1886. This is a chronicle of all the new inventions and improvements relating to these machines.

AN old correspondent of SCIENCE-GOSSIP, and a well-known botanist, Mr. G. C. Druce, F.L.S., announces the publication, at an early date, of "The Flora of Oxfordshire and the Contiguous Portion of Berkshire." It will make a volume of 500 pages, and the price will be 10*s.* to subscribers.

THE "Youths' Scientific and Literary Society of London," whose headquarters are at the Tolmer's Square Institute, Drummond Street, is making excellent progress and doing excellent work, both at headquarters and at the country branches. Mr. A. Ramsay, F.G.S., editor of "The Garner," is president for the current year.

MICROSCOPY.

THE WING-CASE OF BEETLE (*Cicindela campestris*).—The "dots" on the under membrane are hair-like projections, and are situated at regular intervals from each other. Dr. Carpenter, I since learn, speaks of them as tubes. The double lining of the circular cells of the intermediate membrane is real, and in no way connected with depression of the cell. Lastly, the hexagonal cells of the upper surface are thrown into spherical protuberances, in the same manner as the eyes of most insects. From the coincidence in distance between the tubes of the under membrane and the centres of the hexagonal cells an interesting problem suggests itself: What is the purpose of these tubes? Are they merely supports in maintaining the rounded surfaces of the cells, or, if not, what end do they serve, and why the coincidence between each hair and cell centre?—*R. F. M.*

THE QUEKETT MICROSCOPICAL CLUB.—The last number of this well-known journal (edited by Mr. H. Hailes) contains the following papers and notes: "On a New Form of Live-Box," by C. G. Dunning; "On *Spongilla fragilis* found in the Thames," by B. W. Priest; "On the Interpretation of Microscopic Images with High Powers," by E. M. Nelson; "On a new species of *Gamasus*," by A. D. Michael; "On the Finer Structure of certain Diatoms," by E. M. Nelson and G. C. Karop; also a list of the objects obtained in the excursions during the year 1885, etc.

REMOVING CUTICLES.—Will some reader have the kindness to say how the cuticles of leaves such as Deutzia, stinging-nettle, and others containing interesting hairs may be removed? Boiling in water has been recommended, but I am not successful with that plan. The difficulty seems to be the removal rather than the loosening of the cuticle.—*H.*

NEW AND INTERESTING SLIDES.—We have received from Mr. Fred Enock Nos. 2 and 3 of his "Entomological Sketches"—the "fairy fly" (*Anagrus incarnatus*), and the head of a ground bee (*Colletes Daviesiana*). It is a capital method of studying entomological anatomy, to have a pictorial detail and verbal description together with the actual objects themselves mounted as few besides Mr. Enock can. Mr. H. Vial, Crediton, has also sent us three of his now well-known anatomical sections of the lower lip of monkey, kidney of monkey, and spleen of ditto, all injected with carmine. To Mr. Moss our thanks are also due for a neatly mounted specimen of the rhizopod *Clathrulina elegans*, new to England, which he describes in our present number.

THE June number of the "Journal of the Royal Microscopical Society" is also to hand, containing the following papers: "The Life History of an Acarus, one stage whereof is known as *Lapidophorus talpæ*, Kramer; and on an Unrecorded Species of Disparipes," by A. D. Michael; "On *Micrococcus Pasteuri*," by Dr. G. M. Sternberg; and on "A new Polarising Prism," by C. D. Ahrens. All the papers are illustrated.

ZOOLOGY.

PATHOLOGICAL CONDITIONS IN THE MOLLUSCA.—If I understand the conclusion of Mr. Cockerell's article on p. 98 aright, viz., that a pathological condition may be transmitted, and so become congenital, and afterwards so normal as to justify the formation of a new species, as he illustrates, I would point out that such a kind of transmission does not always obtain, and consequently must be considered more or less as an accidental occurrence. In cases of albino (*Helix grisea*, Linn.), Dr. Martinati observed that their produce were normal (E. de Betta, "Moll. prov. Veron," pp. 60, 61). Hartmann ("Gastropoden d. Schweiz") explains albinism in shells to be due to moisture, cold, and want of sunshine, and there seems every reason to believe that they form factors in its production.—*J. W. Williams.*

AERIAL HABITS OF EUGLENÆ.—The subjoined extract from a memoir by Dr. D. D. Cunningham, of Calcutta, on "The Relation of Cholera to Schizomycete Organisms," will interest students of the Infusoria and the Bacilli: "At almost any season many of the tanks in and around Calcutta are more or less covered by a scum of Euglenæ, which is of a bright brick-red colour in the morning, of a vivid green in the evening, and which is much less conspicuous and defined during the day than it is from sunset to sunrise. These variations in its characters are dependent on recurrent periodic changes in the condition of the component Euglenæ. The definition, and specially the dry dusty aspect of the scum in the evening and early morning, are due to the fact, that at these times the vast majority of the Euglenæ are aerial, and not aquatic organisms, the cells containing the then encysted and passive protoplasts, being raised in various degrees above the surface of the water, and in the majority of cases being entirely removed from contact with it, and projecting freely into the air. The relative inconspicuousness of it during the day is, on the other hand, due to the fact, that they are then submerged, and swimming free in the water. The changes in colour are dependent on alterations in the relative amounts of red oily colouring matter, and specially in alterations in its distribution within the bodies of the protoplasts. The scum is not, however, solely composed of Euglenæ, but, on the contrary, contains masses of the empty cysts and stems with dilated bases belonging to previous cycles of the encysted condition of the organisms. Bright, dry weather tends to induce constantly increasing thickness in this scum, due to the fact, that under such circumstances the normal cycle of developmental changes of form goes on recurring with unbroken regularity, and that accordingly, quite apart from coincident processes of multiplication connected with the encysted condition of the organisms, there is necessarily a constantly recurrent addition of increments of dead matter in the form of empty cysts and stems. Heavy downfalls of rain, on the other hand, tend to cause it to disappear, due to the fact that they both break up the sheets of empty cysts and stems, and by driving the Euglenæ down into the water, tend to prevent their normal assumption of an aerial habit. So long, however, as conditions remain favourable to the regular periodic succession of the diurnal and nocturnal phases in the life-history of the Euglenæ, a steady increase in the scum goes on. Any scum of this nature, composed in considerable proportion of dead organic materials, affords a favourable site for the development of both saprophytic

and parasitic organisms, and we accordingly find it crowded with infusorial, monadinic, and schizomycete forms. Among the latter curved forms are frequently and, under certain conditions, apparently normally present in very large numbers." In his memoir, Dr. Cunningham goes on to show how "comma bacilli" can be obtained with certainty, and in large quantity, by taking a mass of this scum, and introducing it into a jar of water. The Euglenæ die off, and a scum accumulates composed of their bodies, empty cysts and stems, sometimes to the depth of a quarter of an inch; curved schizomycetes precisely resembling those found in choleraic media in their morphological characters crowd the under surface of the scum. In two cases Dr. Cunningham succeeded in developing distinct commas in cultivations where the scum material was used with feebly alkaline agar-agar jelly.—*W. J. Simmons, Calcutta.*

An Additional Suggestion on the Origin of Species.—At a recent meeting of the Linnean Society Dr. G. J. Romanes read a paper "On Physiological Selection: an Additional Suggestion on the Origin of Species." The author contended that the theory of natural selection has been misnamed a theory of the origin of species. It is, in truth, a theory of the origin of adaptive structures, and, if unassisted by any other principle, could not effect the evolution of species. The only other principle that could here assist natural selections would be one that might mitigate the swamping effects of intercrossing. This may be done by geographical barriers shutting off a portion of a species from the rest, and allowing that portion to develop an independent course of varietal history without intercrossing with the parent form. It may also be done by portions of species migrating, changing habitual stations, etc. But it may also be done by what the author calls physiological selection, or in virtue of a variation taking place in the reproductive system in the direction of sterility (whether absolute or partial) with the parent form, without impairment of fertility within the varietal form. For instance, the season of flowering or of pairing may be either advanced or retarded in a portion of a species, when all the individuals in that portion (or new variety) would be absolutely sterile towards the rest of the species, while completely fertile among themselves. They would thus start on an independent course of variated history.

Erratum: p. 123, line 2 from bottom of 2nd col., *for* "10," *read* "1." *Arion ater* var. *cinerea* (p. 142): *Abdomine fasciis tribus atris*, body with three black bands; *lateribus pallidis sesquipollicaris*, with the sides pale for the space of an inch and a half.—*T. D. A. C.*

Albino Immature Herring-Gull.—I have a fine specimen of the herring-gull, in its first year, which is white. This bird was shot in September 1884, on the Filey beach, and was then in company with several others of its own species, and to all appearance of the same age. There has once and again been seen about the breeding haunts, a few miles from this place, a white guillemot. But the oldest fisherman here does not remember having before seen the same freak of nature in the herring-gull. I am sending a photo of the gull to the curator of the South Kensington Museum.—*Joshua Fountain.*

Clathrulina elegans in Lancashire.—On the 19th December, 1885, I found in a pond within a mile of Ashton-under-Lyne *Clathrulina elegans*, a freshwater radiolarian described in the 1881 edition of Carpenter's "Microscope." I have been unable to find any previous record of its discovery in England. Mr. Archer recorded it in 1869 for Ireland and Wales, and it had previously been noted on the Continent. Dr. Leidy, in his "Freshwater Rhizopods of North America," describes it and gives some excellent plates from specimens found by him in the United States. Recently Mr. Whitelegge, a well-known naturalist from this locality, has discovered it in Australia. Its resemblance to some forms of Polycystina is very striking. The first specimen of Clathrulina I met with consisted of four individuals attached to each other. No sarcode was visible, but each capsule contained a cyst-like object. Although I carefully searched many gatherings from the same pond, I did not again meet with it until May 15th, when in some material from another pond I found two dead capsules. On the 22nd May, in another pond (about four miles distant from the pond where I found the first specimen, and five from the second), I discovered the living object. This specimen was solitary and attached to a stem, the pseudopodia streaming through the apertures in all directions. I have only found one other living specimen. The last gathering contained many capsules, some empty and solitary, others containing cysts, mostly detached from the stems. I have mounted one specimen containing six cysts, which can be seen quite distinctly within the capsule. Another contains five. The colour of these cysts is a decided brown. Other capsules from the same gathering were found attached to each other. I am indebted to my friend Mr. Chaffers, of Manchester, for the accompanying drawing of a group of four, which illustrates beautifully the appearance of one specimen of the dead object.—*William Moss, Ashton-under-Lyne.*

Mice eating Bitter-sweet Berries.—There is in my garden a "rockery" formed of bog-oak stumps and large stones, over which is trained, to form a screen, a luxuriant plant of the bitter-sweet nightshade (*Solanum dulcamara*, L.). Every autumn this is covered with a profusion of the beautiful red fruit-clusters, on which I notice in early winter mice feed, clearing the twigs of the berries in a very short time after they first attack them. They have done

so for the last few years, and, though I have watched closely, I have never seen any bird touch one. The poisonous properties of this attractive fruit are too well known from their effects on children who have unwittingly partaken of them; but is there any other animal besides the mouse which can eat them with impunity?—*H. W. Lett, M.A.*

The Development of the Tadpole.—Miss Kingsford, in her article "On the Development of the Tadpoles of the Common Frog," has left out what I consider to be the most interesting feature in tadpole life, viz. the manner in which the tail is absorbed. Metskinkoff, by a microscopic examination of some teased portions of a tadpole's tail, has shown that the absorption is due to the activity of leucocytes, or white blood corpuscles—those amœboid scavengers of the blood—and that they are seen hurrying away with part and parcel of the muscular tissue of the tail in their sarcodous substance, most probably to help to build up the limbs. It is then really a normal pathological process, a process of inflammation—a determination of leucocytes to a point. I may also add that Mr. J. Bland Sutton has confirmed Metskinkoff's view, and this not only in the tadpole but also in the larval ascidian.—*J. W. Williams.*

"The Rotiferæ, or Wheel Animalcules," by Dr. C. T. Hudson and P. H. Gosse, F.R.S. (London: Longmans). Part 4 of this important monograph has just appeared. It is devoted to the families Triarthradæ, Hydatinidæ, and Notommatadæ (the latter a very large and elastic group). The coloured plates give upwards of a hundred figures and details of all the leading kinds of rotifers. Only two more parts are necessary to complete this beautiful and much-required work.

BOTANY.

Potentilla tridentata.—Could any of the readers of Science-Gossip inform me if they have ever seen or heard of *Potentilla tridentata* under cultivation?—*Thomas Fisher.*

Notes on Cardamine pratensis.—Since asking the question as to the viviparous character of *Cardamine pratensis*, I have carefully made the following observations of plants taken indiscriminately from different positions with different degrees of moisture: April 27th, 3 plants in damp ditch, 2 viviparous. March 30th, 14 plants in rather moist field, 3 viviparous. March 30th, 12 plants in very moist field, all viviparous. March 30th, 5 plants in rather dry situation, 2 viviparous. March 30th, 2 plants in rather dry situation, none viviparous. April 1st, 1 plant in moist ditch, viviparous. April 1st, 13 plants in boggy field, 12 viviparous. April 1st, 6 plants in boggy field, 5 viviparous. April 1st, 8 plants in another part of the same field, 8 viviparous. According to this, I find that 70·3 per cent. of the cardamines have proliferous leaves. I found all plants in very damp places invariably with plant-bearing leaves, and had small plants in different stages of growth close to them. As Mr. Burder remarks in your last issue, I found the end lobe of the leaf to be more fertile than other parts.—*B. Taylor.*

Hesperis matronalis.—I have found this plant growing freely and vigorously, in a copse separated from the high road by a low wall, between Rotherham and Wickensley, Yorkshire. Hooker regards it as "not even naturalised," but its strong habit and profusion in this particular spot would certainly lead one to doubt the statement.—*Geo. Arthur Grierson.*

GEOLOGY, &c.

The Albatross a Northern Bird.—Mr. R. Lydekker recently described before the Geological Society two bones of a bird in the Ipswich Museum collection, which had been found in the Crag beds. He showed that these bones were those of the albatross. At present the albatross is confined to the seas of the southern hemisphere, but in the Pliocene period these fossils demonstrate that it existed in the northern.

The United States Geological Survey.—From the Government of the United States we have received Bulletins 15–23 of the Geological Survey of that country. European geologists are always glad to get the reports of the American geologists, and the American Government sends them out with a generosity which makes us ashamed of the mean and shabby parsimony of our English Stationery Office. The following are among the chief memoirs contained in the Bulletins: "The Mesozoic and Cenozoic Palæontology of California," by Dr. C. A. White; "The Development of Crystallisation in the Igneous Rocks of Washoe, etc.," by Messrs. A. Hague and J. P. Iddings; "The Higher Devonian Faunas of Ontario County," by J. M. Clarke; "The Stratigraphy of California," by G. F. Becker; "The Mineralogy of the Rocky Mountains," by Whitman Cross and W. F. Hillebrand; "The Lignites of the great Sioux Reservation," by Bailey Willis; "New Cretaceous Fossils from California," by Dr. C. A. White; "Marine Eocene, Freshwater Miocene, and other Fossil Mollusca of Western North America," by Dr. C. A. White, etc.

"British Petrography."—The fifth part of this useful and splendidly got-up work has appeared, devoted chiefly to the Leucitic group. The coloured plates illustrate sections of Olivine-Dolerite, or "Greenstone," as it used to be called.

Discovery of the Remains of Extinct Animals in Westmoreland.—During the last two years a considerable number of the bones of extinct animals have been found in Westmoreland and Cumberland. These consist of *Bos primigenius*, *B. longifrons*, brown and cave bears; of human bones—tibia, humerus, femur, ribs, and part of cranium—these are of a child and an adult; wolf, wild bear, wild cat, badger, horse, several of the weasel kind, fox, a great quantity of the bones of deer—red and fallow—together with the remains of animals at present existing. A large and perfect skull of a beaver has also been discovered at Sedbergh, on the border-line of Yorkshire and Westmoreland. The Lake District abounds in limestone escarpments, and the caverns in which the bones are found are along the faces of them. In some of the limestone recesses are traces of human occupation, such as burnt charcoal, a bone needle, an awl, and an arrow-head. Some of the bones exhumed contain evident traces of human workmanship. The floors of the caves in which these are found are covered with pieces of limestone varying in weight from a pound to several hundredweights. Beneath this is a band of red loam, and under this again a dense deposit of red clay, in which the bones are imbedded. In many cases the blocks of stone which cover the first floor are covered with stalagmatic matter, and stalactites depend from the roof. The district embraced would originally be comprised by the great Caledonian forest, which was one of the strongholds of the larger forms of a past British fauna.—*Dipton Burn.*

The Geologists' Association.—The last number of the Proceedings of this Society contains the following papers: "The History of Fossil Crocodiles," by A. Smith Woodward, F.G.S.; "Phenomena observed in the Devonian and Carboniferous Beds in Belgium," by Professor E. Dupont; "Note on the Large Bird from the Eocene of Croydon," by E. T. Newton; and a paper on "Flightless Birds," by Dr. Henry Woodward.

NOTES AND QUERIES.

Bird Sounds.—Will some reader kindly tell me what bird it is that makes a sibilant sound not unlike a soft pea-whistle long continued? There is also a bird I hear in the evening reminding me in its cry of a hoarse peewit. It makes a grating noise, and I do not hear it till it is getting dark. Both these birds I hear in the spring.—*C. C. S.*

Gum Tragacanth for Insect Mounting.—If "V." will put ten drops of acetic acid to every half-ounce of gum tragacanth, I think he will find that it will keep almost an unlimited time, the acid preventing chemical decomposition.—*R. A. R. Bennett.*

Gum Tragacanth.—In reply to "V.'s" query, I beg to say that gum or paste of any kind may be kept good for any length of time by mixing well in a small quantity of arsenic or corrosive sublimate (bichloride of mercury).—*W. Finch, junior.*

Mistaken Instinct.—The following experiment was made by the writer directly after reading notes on the subject in Science-Gossip. I had a pet toad with other reptiles in a vivarium. The only food my friend would touch consisted of living insects, such as flies, wasps, butterflies, wood-lice, etc.; a dead creature he always rejected. I attempted to impose on him after some careful preparation. I gathered the fly-orchid, severed a single flower from the stem, attaching the "fly" to an invisible black thread. This was gently played in front of "Beelzebub" (such was his name, and he was a pet of ten years' standing); in a moment his eye was fixed on the moving fly, his tongue darted out, and the bait was swallowed. He "winked his eye slow," and evidently thought well of the food, nor did it have any ill-effect. The old fellow was clearly deceived. He saw a moving insect, as he thought, and that was enough. The same toad could eat any number of wasps without injury. A hornet he tried, but quickly spit it out of his mouth. A second one, given a week afterwards, he refused to touch; he appeared unwell for a day or two after his trial hornet, and I believe he was stung. A butterfly he dearly loved, but could not swallow it easily on account of the dry "down." Mark his instinct—the fore-feet were dipped into his bath, and several times the side of the mouth was moistened. In this manner only could Beelzebub dispose of a whole butterfly.—*F. G. S.*

Twin Trees.—In a field near Leominster there is a tree, or rather two trees—oak and ash—growing, as far as can be made out, from one single trunk. They grow together for about four feet, and then divide. How can this be accounted for? It is considered about here one of the sights of the neighbourhood.—*Howarth Ashton.*

Palm-trees.—In the garden of our college here, in Santiago, Chili, are eleven palm-trees, of which number three of them have shown a very curious development, viz., every time they flower they throw off a lateral branch from the main trunk; and if this branch flowers, which it does in two years, it again throws off a new branch, but the head of the old one dies, whereas, when the true head of the palm (trunk-head) flowers, that does not die. At present, as I say, three of these curious palms present the rare appearance of two with two branches each, and the other with no less than five branches midway, and two above. Has this been noticed in other plants of the palm tribe, or are these merely freaks of nature, as I think that all the order of Monocotyledons are known by their being destitute of branches, and merely having the tuft of leaves at the top of trunk.—*Wm. Bartlett-Calvert, Colegio Ingles, Santiago, Chili.*

Preserving Zoophytes.—Can any reader of Science-Gossip kindly tell me the best means of preserving zoophytes, so as to stiffen them without rendering them brittle? Also, which bleaching fluid would be the safest to use when specimens are required white?—*Glaucus.*

Eggs of Buff Ermine Moth.—On looking through my puparium on the 10th of May, I found that a female of *Arctia lubricipeda* (buff ermine moth) had emerged from the pupa, which to all appearance was dead. To be certain that the moth was dead before mounting it, I put it in the cyanide bottle for

a quarter of an hour, and during that time no signs of life whatever were exhibited. Feeling certain that the moth was dead, I fixed it on the setting-board, the insect being somewhat stiff. After being on the board for a week, I looked to see how it was, and to my surprise saw that one of the wings had come from under the braces, and the insect had laid from fifty to sixty eggs. The eggs are greenish-yellow. Can any of your correspondents give any explanation of this singular phenomenon?—*G. F. Harding.*

REMARKABLE PRIMROSE.—On Tuesday, the 20th of April, whilst plucking primroses at Howeistone, I came across some singular blossoms on one or two plants in a clump. The petals, instead of the broad and indented end, had a narrower and pointed end. Can any of your readers give examples of this, or explain the cause?—*Gresham F. Gillett.*

LARVA IN SEA-WATER.—Looking at some sea-water in the microscope the other day, I was very much surprised to see, crawling quietly among the sediment, a creature exactly like a young bloodworm (larva of Chirnomus). I lost sight of it afterwards, but I had examined it closely, and am certain what it was. Are any larvæ of this family known to live in the sea? I have in my aquarium (marine) a young three-spined stickleback, caught in the sea at low water. I thought this species was confined to fresh water.—*Frederick Rutt, Folkestone.*

DUMBLEDORES.—In response to Mr. Paulson, I may state that I have watched the insects popularly called "dumbledores" pierce the bases of the corollas of the broad bean, apparently for the purpose of extracting the honey secreted therein. I have not yet observed the same method pursued with regard to Antirrhinum flowers, but, having a specimen well in bloom just now, will keep an eye on it when at leisure. I see "Mark Antony," alludes to having noticed the same fact (p. 143).—*G. A. Newman, Medical Staff Corps.*

SPOTS ON SYCAMORE LEAVES.—I should be glad if any of your readers could tell me the cause of the black spots which appear on the leaves of the sycamore in the summer. Do similar spots appear on the leaves of any other trees?—*W. B. Drummond.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

A. DOWNES.—Your supposed lichen, found growing on bark of larch, is a fungus, one of the Myxogastes, perhaps *Licea fragiformis*. No. 2 (on sweet potato) is also a fungus, probably *Polyactis vulgaris;* No. 1 (found on common anemones) is *Urocystis pompholygodes*, not uncommon on the Ranunculaceæ.

H. MULLER.—The minute objects on paper are not a fungous growth, but the dendritic crystallisation of the oxide of manganese.

F. C.—You are elected a Fellow of the Geological Society on the personal recommendation (signed) of two Fellows, "from a knowledge of your work and writings." The entrance fee is £6 6*s.*, and the annual subscription £2. No examination is required.

J. WALLIS.—Your note in reference to Mr. Mattieu Williams's "Gossip" is *mal à propos*. You will find a short description of the supposed human footprints from Nevada in SCIENCE-GOSSIP two years ago.

MR. SWAINSON.—You will find an excellent summary of the relations of all the Amœboid forms, animal and vegetable, in the Introduction to the first vol. of Kraus's "Zoology" (translated by A. Sedgwick). See also same subject in Sachs's "Botany," last edition.

F. WESTON (Folkestone).—We have written to Mr. Youlton (who is an American gentleman) about his composite photographs, as you desired. We should be pleased to forward you our own lithographed illustrations of the same (which came out in a special number of "Science," and have lately been repeated from our ethnological point of view).

H. A. CROSSFIELD.—Get Flower's "Osteology," published by Macmillan, price 6*s.* Your newts are probably *Triton cristatus*.

A. W. SPANTON.—Mr. G. H. Skuse's address is 9 Wellington Road, Bow Road, London, E.

M. ANTONY.—Frogs breathe through their skin when they are immersed for a time in water.

P. F. G.—The publisher of the excellent "Saturday Half-Holiday Guides" is T. Fisher Unwin, 17 Holborn Viaduct, London, E.C. Your specimens are: 1, *Viola palustris*; 2, (specimen came too dried up and obscure to identify. Our friends should wrap their plants in oiled silk, or else they come so shrivelled that a botanist might as well try to find out the plants in a haystack); 3, *Carex precox;* 4, a viola, specimen too incomplete to identify; 5, lamb's lettuce (*Valerianella olitoria*, very common in the Eastern Counties. 6, too much dried up, probably a species of medicago; 7, ditto, a species of viola.

W. ROSE.—The facts you narrate are all well known to naturalists. You will find that Dr. Romanes refers to them in his "Mental Evolution in Animals," also Mr. Frank Buckland in his "Curiosities of Natural History."

W. HAMBROUGH.—Your specimens reached us in a very dried-up condition, but the nettle seemed to be the Roman nettle (*Urtica pilulifera*). We could not tell, however, without the fruits.

E. HALKYARD.—Your geological specimens are *Nummulites lævigatus*, from the nummulitic limestone. The name of the lemon sole is *Solea aurantiaca* of Günther.

A. PHAROAH.—Get Professor Oliver's "Indian Botany," (Macmillan & Co.), price 4*s.* 6*d.* Hooker's "Himalayan Journal" will give you a capital idea of the flora, etc., of the mountains.

A. OGILVIE.—Many thanks for specimens of micro fungi.

ALPHA.—Your specimen certainly appears to be *Luzula sylvatica*, but it is unusually long in the stem.

H. L. C.—Get Hastings' "Our Summer Migrants" (illustrated), price 10*s.* 6*d.*, or Adams' "British Birds and their Eggs" (coloured plates and illustrations), price about 7*s.* 6*d.* Also H. G. and H. B. Adams' "Smaller British Birds," 12*s.* 6*d.*; Atkinson's "British Birds, Eggs, and Nests," price 3*s.* 6*d.*; Jardine's "Natural History of British Birds" (Naturalist's Library series), with 120 coloured plates, 4 vols., price about 15*s.*

A. BLAIR.—The scientific names of plants are often derived from Greek as well as Latin, so that Ainsworth's dictionary would not be sufficient. You cannot do better than get Rossiter's "Dictionary of Scientific Terms," an excellent work, published by W. Collins and Sons, Glasgow, at about 4*s.*

EXCHANGES.

WANTED, Cooke's "Ponds and Ditches," and other micro and natural history books, and land and freshwater shells. Good micro slides and shells in exchange.—J. C. Blackshaw, 4 Ranelagh Road, Wolverhampton.

EXCHANGE, a collection of about 1500 fossils for disposal. About 600 species. Also some duplicates and geological books. —J. A. Floyd, 18 Whiting Street, Bury St. Edmunds.

SECTION of potato, double stained, in balsam, starch grains *in situ*. Also foreign stamps, Peru, Uruguay, Salvador, etc. Wanted, Lepidoptera, insects rare in Scotland preferred, e.g. Io, Antiopa, Album, &c.—W. B. Drummond, 10 Hartington Gardens, Edinburgh.

Melicerta ringens, in exchange for other object of interest. —W. E. Harper, Norfolk Road, Maidenhead.

WANTED, a microscope. Will exchange a beautiful astronomical telescope. The 3½-in. speculum is by Mr. With; the alt-azimuth, stand, and mountings by Mr. Browning. It has three eye-pieces, magnifying 50, 120, and 200 diameters; also a terrestrial eye-piece. Apply to Chas. F. George, 1 Ystrad Road, Pentre, near Pontypridd, South Wales.

A FEW specimens of land shells from Madeira and Porto Santo for exchange. Wanted, land, freshwater, or marine British or foreign shells. Write for list and state offers to F. W., Drapers' College, Tottenham.

EXCHANGE, duplicates, Suffumata, Procellata, Affinitata, Decolorata, Geoffrella. Many common species wanted.—W. Macmillan, Castle Cary, Somerset.

WANTED, British marine shells. Exchange shells or micro slides.—J. T. Lightwood, Hope House, Lytham.

WANTED, Rye's "British Beetles," and Staveley's "British Spiders." Exchange shells, micro slides, or books.—J. T. Lightwood, Hope House, Lytham.

FOR exchange, "The Naturalists' World," 1st vol.; SCIENCE-GOSSIP, June to December, 1885, with plates, perfectly clean and in very good condition. Desiderata, Pisidium, Valvata, Bulimus, Pupa, Vertigo, *Balea perversa*, *Achatina acicula*, *Cyclostoma elegans*.—C. H. Pierson, 16 Brunswick Place, Leeds.

SEND stamped addressed envelope for leaf of *Deutzia scabra*, showing stellate hairs on both surfaces, dried and ready for mounting.—H. E. Hurrell, 1 Church Plain, Great Yarmouth.

WANTED, stone implements, coins, flint gun, or any kind of old armour, in exchange for English and foreign minerals, geological specimens, bison bones of the Pleistocene period, perfect and rare.—G. W. Wood, Castleton, Derbyshire.

WANTED, to correspond with a worker in Ascidians and Sponges.—Geo. Merritt, 282 Commercial Road, London, E.

440 British wild plants, correctly named and localised. Many rare; some very rare. What offers?—C. A. O., 7 Cavendish Terrace, Wellesley Road, Torquay,

FOREIGN butterflies: collectors having duplicates, especially Papilionidæ, please send lists at once, in return for my new one just ready. Correspondence—in English, where possible, would greatly oblige.—J. C. Hudson, Railway Terrace, Cross Lane, Manchester.

EXCHANGE "Roxburgh Ballads," with quaint cuts, as new; "Compendium of the English Flora," 2nd ed., 1844; "Reign of Law," People's ed.; Lee's "Introduction to Botany," 1765. Fresh plants in flower of *Potentilla Norvegica* for natural history books or shells.—George Roberts, Lofthouse, Wakefield.

FOR exchange, a small microscope, good repair, and classical books. List on sending stamped envelope. Wanted, larger microscope or Shuckard's "British Bees."—G. F. Gillett, the School House, Norwich.

WILL exchange Turner's "Anatomy" and Nicholson's "Zoology" (latest editions, new) for Sachs' "Botany," or books on grasses, mosses, fungi.—G. A. Grierson, 74 Market Place, Sheffield.

WANTED, named Irish, Scotch, and other British mosses and Hepaticæ. Will give land and freshwater shells, or offers. —C. T. Musson, 23 Mapperley Hill, Nottingham.

WANTED, books on British mosses. Exchange or cash. Offers.—C. T. Musson, 23 Mapperley Hill, Nottingham.

WANTED, a good mount of *Noctiluca miliaris*, fluid preferred. Good exchange or cash.—C. H. Griffith, Turgiss, Winchfield, Hants.

GEOLOGICAL collection; will exchange whole or in part for books on chemistry or apparatus.—H. B. Stocks, 41 Moorfield Villas, Halifax.

WHAT offers in mounted slides or micro material for SCIENCE-GOSSIP for 1885, unbound.—Geo. J. Wightman, 1 St. Mary's Hill, Stamford, Lincolnshire.

THIS season's eggs, sideblown one hole, separate or in clutches: ring-ouzel, lesser redpole, twite, stonechat. Exchange for others same value data.—Jas. Ellison, Steeton, Leeds.

OFFERED, some vols. of Jardine's "Naturalist's Library," and other natural history books. Wanted, Wood's (larger) or Cassell's (Duncan's) "Natural History," in vols. or parts.—J. H. K., 18 Church Street, Commercial Street, E.

SLIDES of *Hæmatopinus bovinus*, wing of *Urania rhipheus*, inner and outer lining of cocoon of *Hylotoma rosæ*, for polariscope, and many others, in exchange for other slides.—Rev. J. Stroud Williams, Livingstone Villa, Iffley Road, Oxford.

WANTED, ova of any of the hawkmoths, or Bombycidæ, &c. I will endeavour to make a suitable return.—R. Laddiman, Hellesdon Road, Norwich

WANTED, some good polished specimens of flint coral madrepores from the island of Antigua. Also small recent corals, not larger than a man's fist, and any curious shells from Japan and Ceylon. Will give polished slabs of Devon corals, Haldon fossils, and other varieties, British sea-shells, land and freshwater shells, minerals, micro sections, &c.—A. J. R. Sclater, Bank Street, Teignmouth, Devon.

WANTED, mounted sections of corals in flint. Will give three unmounted fine sections of Devon coral for each slide sent.—A. J. R. Sclater, Bank Street, Teignmouth, Devon.

SMALL compound achromatic microscope, about 1-in. power, ball and socket stand, in case, complete. Wanted, botanical books, phanerogams, or mosses.—W. P. Hamilton, 2 Underdale Villas, Shrewsbury.

TEN or twelve years of SCIENCE-GOSSIP. What offers for the same in coins or rare foreign shells?—A. J. R. Sclater, Bank Street, Teignmouth, Devon.

MICRO slides to exchange for books, as "Good Words," "Quiver," Dickens's Works, and one on ferns.—W. S. Anderson, Ilkeston.

WANTED, larvæ of any of the silk moths. Exchange in insects, birds' skins, or eggs.—S. L. Mosley, Beaumont Park Museum, Huddersfield.

FOR exchange, 3 vols. Tennant's "British Zoology," quadrupeds, birds, reptiles, fish, crustacea, mollusca, testacea, 225 plates, old edition, 8vo. Wanted, Hooker's or other "British Flora."—P. F. G., 80 Leathwaite Road, Clapham Common, London.

HAVE a copy of Tate and Blake's "Yorkshire Lias," published at 28*s*., which I will be pleased to exchange for other geological books of equal value, or for very good fossils.—R. Cairns, The Grove, Currier Lane, Ashton-under-Lyne.

GEOLOGICAL TOUR.—A gentleman would like to hear of another who would join him in the above. Very fossiliferous locality. Start end of July.—Geologist, 7 Wharton Street, W.C.

WANTED, Morris's "Nests and Eggs of British Birds," in exchange for Kirby's "European Butterflies and Moths," in 61 numbers unbound, and for the most part uncut.—D. A. Keogh, 7 Castle Terrace, Broughty Ferry.

L. C. 7th ed. Offered 41, 812, 1327, etc.; many desiderata. —Wm. A. Clarke, The Grove, Chippenham, Wilts.

MICRO slides offered, Hepaticæ, freshwater Algæ, marine Polyzoa, spiders, parts of insects, hair of sea-mouse, etc. Wants, insect and other good slides, old vols. of SCIENCE-GOSSIP, also books on spiders and insects.—Lists to W. E. Green, 24 Triangle, Bristol.

WANTED, the tops of *Hyoscyamus niger* (about six inches) when in perfect flower—a dozen or two.—Mr. Higginson, Newferry, Birkenhead.

WANTED, large harmless water-beetles (*Hydrous piceus*), also water-spiders for aquaria. Exchange for Vallisneria plants, &c.—Miss Lyon, 73 London Street, Reading.

WANTED, in exchange for beautiful Red Crag fossils, eggs of the following: Golden eye, great northern diver, black-throated diver, little auk, green cormorant, gannet, Sandwich tern, whiskered tern, gull billed tern, Fulmar petrel, great shearwater, Manx shearwater, great black-backed gull, rock pipit, mountain finch, lesser redpole, mountain linnet, chough, raven, rook, common swift, wood-grouse, little ringed plover.—E. H. B., care of Editor of SCIENCE-GOSSIP.

BOOKS, ETC., RECEIVED.

"Her Majesty's Colonies" (London: W. Clowes & Sons).—"Bright's Guide to Bournemouth."—"Holiday Notes in East Anglia."—"The Rotifera," by Dr. C. T. Hudson and P. H. Gosse, part iv. (London: Longmans & Co.).—"British Petrography," by J. J. Harris Teall, part v. (Birmingham: Watson Bros.).—"Ninth Annual Report of Hackney Microscopical Society."—"Journal of the Royal Microscopical Society" (June)—"The Scientific Enquirer" (June).—"The Hoosier Naturalist."—"The Garner" (June).—"The Naturalist."—"Journal of the Quekett Microscopical Club."—"Air and Water and Soil, as affecting Health," by W. J. Simmons.—"The Botanical Gazette."—"Ben Brierley's Journal."—"Illustrated Science Monthly."—"Journal of the New York Microscopical Society."—"Science."—"Bulletins of the U. S. Geol. Survey," 15 to 23.—"Journal of Conchology."—"New York Medico-Legal Journal."—"Journal of Trenton Nat. Hist. Soc."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM: J. B.—W. R.—W. K. M.—F. C. T.—G. M.—C. D. jun.—H. W. C.—G. T. R.—W. J. S.—H. B. S.—J. W. W.—P. H. H.—J. W.—G. F. G.—G. F. H.—U. J. S.—C. T. M.—C. H. G.—E. R. P.—J. S. C.—G. T.—R. F. M.—W. H.—G. A. G.—G. C. D.—W. I. H.—R. A. N. L.—J. W. C.—T. R.—C. F. W. M.—F. C.—S. T. K.—G.—W. B. C.—J. C. P.—H. V.—W. G. W.—G. Q. J.—F. G.—M. W. N.—W. R. S.—A. C.—A. C. C.—W. M.—F. H.—J. W. N.—F. H. A.—W. B. C.—F. R.—G. I. W.—S. M.—F. E.—M. G.—J. E. N.—G. P.—N. L.—G. M.—M. A. L.—W. S. D.—J. C. H.—G. W. W.—E. D.—T. G. T.—W. M. H.—G. R. T. F.—G. A. N.—J. W. R.—M. A.—H. W. L.—G. S. S.—C. T. G.—T. D. A. C.—E. R.—G. H. P.—J. T. L.—R. M.—W. M.—C. A. O.—M. H. R.—H. E. H.—H. M.—W. B. D.—T. W.—F. W.—W. E. H.—I. A. F.—J. E. B.—W. F. jun.—G. A. G.—J. E.—W. M.—I. H. K.—W. R. H.—C. P.—R. L.—J. S. W.—H. M. A.—A. J. R.—J. F.—R. A. R. B.—W. M.—P. T. R.—W. P. H.—T. W.—T. R.—I. H. A.—T. W. W.—J. W. W.—R. C.—P. G. F.—D. B.—W. S. A.—G. F. R.—W. C.—W. W. M.—F. G. S.—H. W. L.—W. J. Paul.—S. L. M.—F. L.—W. A. C.—W. E. G.—L. S.—H. W. L.—D. A.—H. H.—M. L.—H. G. D. &c. &c. &c.

LEPIDOPTERISTS' WORK FOR AUGUST.

By W. FINCH, Jun.

MY first duty this month must be to thank those of my readers who have so kindly written to me, expressing approbation of my former papers. To such I would say that they must please to be content with this acknowledgment, as I could not possibly undertake to answer each one of so many separately by post. This month the lepidopterist will be able, and indeed obliged, to use all means and appliances noted heretofore for the capture of specimens. Care must be taken to keep the collecting-box damp this hot weather, or the specimens will require "relaxing" by the time home is reached. This is a splendid time for the capture of butterflies; bright, hot sunshine, after showers and light rains, bringing out the fragrance of the flowers. In the clover and lucerne fields myriads of insects of all orders will, as a rule, be found. Nothing, however, is worse than clover and lucerne for retaining the wet. Care must therefore be taken not to get a deathly chill whilst chasing insects in these latter fields. In case of excessive thirst, the leaves of the common sorrel will be found very refreshing if chewed.

Many ova may now be found, especially those of butterflies. The opportunity for securing them should not be lost, for very few will be found in the succeeding months of the year. Where the food-plant of a species is abundant, and the insects are known to frequent that locality, conspicuous sprays of the food-plant may be gathered and conveyed home to be examined at leisure and with the aid of a magnifying glass; some eggs are so small as to make this plan absolutely necessary to procure them.

Whilst on this subject, I wish to call the attention of my readers to an interesting fact in connection with the pairing of insects. Those which will not pair under any circumstances indoors will frequently do so immediately on being placed in the open air. Try this plan with an obstinate pair of insects, and the result will astonish you.

Larvæ will be found in plenty by day and night, modes of capture as previously recorded. Some larvæ—notably *D. vinula* and *A. iris*—are very persistent in clinging to their food-plant; these will require a long-continued shaking before they can be dislodged. In event of larvæ being picked off the food-plants, be careful not to handle the larvæ themselves; always break or cut off the twig or leaf on which they are reposing. Never handle larvæ on any account; in giving fresh food always place it beside the old, when they will quickly transfer themselves to the fresh, and the old stuff may be readily removed. Many larvæ taken this month will be noticed to feed slowly and in a very deliberate manner. If kept, these will prove to be hybernating larvæ. It is often difficult so to preserve the conditions of nature throughout the winter as to keep these larvæ in health. They frequently die, refusing all food in a most obstinate manner. Of these larvæ I will merely mention those of the fox-moth (*B. rubi*), which are exceedingly handsome and well worth preserving. I have found them in great numbers on the Lincolnshire coast, close to the sea, feeding on brambles, etc. Yet, strange to say, I have never yet seen the cocoon or perfect insect there. If any of my readers possess a refrigerator they will be able to keep these larvæ throughout the winter by placing them therein; they hybernate "full fed," and spin up almost immediately upon emergence from the lethargic state. Judging from those I have kept, however, I should say that they are the favourite victims of the various Ichneumons.

With regard to these latter insects, they should be carefully preserved, and placed side by side with the

insects they are in the habit of attacking; they form a very interesting study.

For pupæ proceed as directed last month. Digging for pupæ may be commenced towards the latter end of this month. By beginning thus early finer specimens may be procured, before the disastrous effects of floods, mice, and moles have thinned the ranks. From this time until the winter is over, "pupæ digging" should form a part of the lepidopterist's regular routine of work. Next month I will give what I find to be the best way of preserving pupæ in a healthy state throughout the winter. For the present, however, give such of your larvæ as undergo subterranean pupation a pan of moss, which always keep slightly damp.

Now as to imagos: there is as much, if not more to be done among these this month as last, and much the same methods of capture are to be employed.

With regard to killing these when caught, or when freshly emerged from pupæ, a "cyanide bottle" is the best for this purpose. Cyanide of potassium has no objectionable qualities about it as other poisons have; it does not take the colour of insects, and, moreover, insects may be left in the bottle for a week or even a fortnight, and will be just as fresh and easy to "set out" as when first killed—indeed more so, for cyanide has the effect of stiffening the limbs of insects when first killed by it: but if they be left in the bottle for twenty-four hours they will be perfectly flexible again. I would warn my readers though, of its deadly nature, and great care must be taken in using it.

All kinds of flowers will be an attraction for butterflies as well as for moths. It must not be thought from this, however, that butterflies are to be found only where there are flowers, for such is far from being the case. Nothing is so curious as the strange fancies and tastes that insects have in selecting a place of resort. Often a barren, waste piece of land will be literally alive with bright butterflies flitting here and there over the bare ground or scanty herbage, nothing of an attractive nature being apparent to the human eye; and yet these little creatures have localised themselves on this spot, and will not leave it, although but a short distance away maybe there are lovely flowers and such conditions as one would suppose inseparable from a butterfly's life. This localisation of insects is a strange and unaccountable feature in their natural history.

Newly cut birch is a great attraction for lepidopterous insects, as are the gummy exudations from the same. Clover and lucerne, as already mentioned are a great attraction, also fallen fruit: the family Vanessa seems especially weak on this point—*V. antiopa* may thus be sometimes surprised. Street lamps are a great attraction. At early dusk, the Sphingidæ may be netted as they hover over the flowers.

ERRATUM.—In last month's article, third paragraph, second line, for *E. lacustris*, read *E. lanestris*.

158 *Arkwright Street, Nottingham.*

THE MICRO-FUNGI OF NORTH NOTTS.

SHERWOOD FOREST and the neighbourhood of the Dukeries is exceedingly rich in cryptogams; and it may be interesting to some readers of SCIENCE-GOSSIP to know that the following representatives of the Œcidiacei have been found there. With five exceptions, I have collected the specimens myself; the exceptions are given on the authority of a careful student, who prepared the flora of this neighbourhood for a book on Worksop and the Dukeries. They are marked by an asterisk, and will doubtless turn up in due course. The pear-leaf fungus, *Rœstelia cancellata*, was very destructive last year at Dinnington, and *R. cornuta* on the rowan, near the Major Oak, at Pleasley, and elsewhere. *R. lacerta* * appears on the hawthorn. *Peridermium Pini* * is found on the Scotch fir. The wild and cultivated anemone alike have their cluster-cups; the former, *Œcidium leucospermum*, being found at Worksop, the latter, *Œ. quadrifidum*, at Budby. *Œ. Epilobii*, the willow-herb cluster-cup, is found at Wellow, Worksop, and elsewhere; as is also the goat's-beard cluster-cup, *Œ. tragopogonis*. Farmers have nearly exterminated the barberry, and I have hitherto failed to find it wild; but *Œ. berberidis* * is recorded. Near Harthill I have just obtained very fine specimens of the buckthorn clustercup, *Œ. crassum*, on *Rhamnus catharticus*, and was surprised to observe how they develop, even after being gathered and placed under slight pressure in a book. The honeysuckle has also yielded its tribute in *Œ. Periclymeni*, and *Œ. calthæ* * is recorded in the work already mentioned. The celandine and creeping crowfoot are terribly ravaged with *Œ. ranunculacearum*, and *Œ. Bunii* has been found this spring on two or three different umbels—probably a new host plant in at least one instance. This year I have had the pleasure of adding *Œ. valerianacearum* to our list of local cryptogams, the specimens being found on the valerian, by the canal-side, near Worksop. The gooseberry fungus, *Œ. grossulariæ*, and nettle cluster-cup occur in various localities, such as Budby, Worksop, Whitwell, Anston, and Shirebrook. Three varieties of the composite cluster-cup have already been turned up—namely, var. *taraxaci*, on dandelion, near Whitwell, this year: var. *Tussilaginis* on coltsfoot, terribly profuse, and var. *Lapsani* on nipplewort, abundant throughout the district. *Œ. saniculæ* occurs near Carlton on the sanicle, and *Œ. violæ* on different species of violet all around the neighbourhood. The mint-fungus, *Œ. menthæ*, is found on various kinds of host-plants, especially on the limestone, and is common on the cultivated as well as the wild varieties of mint. *Œ. primulæ* * I have sought in vain so far, but have no doubt about the genuineness of the record, while thousands of specimens of the garlic cluster-cup came under my notice here last year, and might in all probability be

found in equal plenty to-day in the same locality. There are still some half-dozen forms which I fully expect to find as time goes on. Meanwhile the record stands as follows :—

Species of Roestelia	. . . .	3
,, Peridermium	. . . .	1
,, Œcidium	. . . .	22
Total in ORDER ŒCIDIACEI	.	26

Other Orders are equally rich, as I hope to show on another occasion. I shall be pleased to exchange notes and specimens with other workers in micro-fungi.

HILDERIC FRIEND.

NOCTILUCA; THE COLOUR OF THE RED SEA, ETC.

IN 1882, in the Persian Gulf, I noticed the unusual brilliancy of the phosphorescence mentioned by Captain Wilson-Baker. On a calm night the vessel churned up a milky wake that was visible for several hundred yards. Often, when a shoal of dolphins came along, their tracks under water could be very distinctly traced. We used to wash decks after dark, when I always had a shower-bath under the hose. The water came out of the nozzle like a fountain of sparks, reminding me of a Roman candle, and my whole body seemed luminous. But the most beautiful effect of the kind I ever saw was in leaving the Gulf in the teeth of the south-west monsoon. The waves were immense, and looked, in the darkness, like mountains of molten silver. Occasionally one would come on board, flooding the whole deck, which would then be resplendent.

It used to be the custom for the captains of the ships anchored at Aden to race back to their ships at night, and we used to be able to watch one another's progress, by the phosphorescent gleams stirred up by the oars.

The Persian Gulf struck me more than any other water as being particularly full of marine life. At times the water seemed thick with curious Medusæ, the commonest form of which was a rope-like string of annular jelly-fish of various colours (in shape like red blood corpuscles). The yellow sea-snakes were to be seen basking on the water within a few yards of the ship. Pteropods, too, would flap about like butterflies. Immense shoals of dolphins were always playing about the ship, affording much sport with the revolver. Shoals of flying-fish would come on board at night.

The appearance of "clotted blood," mentioned by Captain Wilson-Baker, I have never seen in the Gulf, though in the Red Sea acres (I am afraid to write miles) of this or a similar substance are common enough. I have always thought that this substance gave the Red Sea its name. In this sea there is a phenomenon called the "white sea." It is described as a milky whiteness overspreading the whole expanse, occurring in January and February, and only visible in the day-time. I have never been fortunate enough to witness it myself, though I spent more than a year on its shore some years ago. It has occurred to me, however, that this appearance may be due to some atmospheric cause, as I remember once in the Gulf of Bothnia, on a very hot still day, the whole sea seemed like a white burnished mirror, the horizon merging into the sky, and no distinct line being visible. Ships seen hull down, and therefore intimating the position of the horizon, seemed higher up in the air than one would naturally have expected them. This appearance I attributed to the haze. If any one could give another solution to the "white sea" in the Red Sea, I for one should be much interested.

LIONEL E. ADAMS.

SCLEROSTOMA DUODENALE: A HUMAN PARASITE.

By HAYGARTH ADDISON, L.R.C.P.,

Licentiate of the faculty of Physicians and Surgeons of Glasgow; Author of "An Essay on the Human Skin," "A short Account of Leprosy," etc.

THIS worm affects man, and is found in the intestinal canal. The upper portion of the tube is the part affected, though in some cases many feet of the small bowel may furnish a habitation for this small parasite. The worm is cylindrical in form, and measures when full-grown about four-tenths of an inch in length. "The males and females are equal in this respect, but the former are much more slender than their companions, and may be additionally distinguished, even with the naked eye, by the corolla-like expansion of the caudal extremity, whence (under the microscope) the hair-like double penis may sometimes be seen projecting" (Bristow). The mouth of the parasite, which is turned towards the dorsal surface, is large, strong, quadrilateral in shape, and armed with eight teeth. The females are very prolific, and the eggs are hatched after their escape from the bowels. The worms attach themselves firmly by the mouth to the inner lining of the bowel so firmly, that the head of the parasite remains after the body of the worm has been detached by the bowel contracting upon the food ingested. The worm lives on the blood which it sucks from the inner coat of the bowel, after the manner of the common leech. The numbers present at any one time vary from many hundreds downwards. Dr. Tarona, of Varese, counted as many as 1250 specimens in the evacuations of a single patient, after the administration of the extract of the common male fern, which is a

2

sovereign remedy. These parasites produce symptoms of great debility, which may continue for years, and often, sooner or later, terminate in death: there is also great bloodlessness produced, by the presence of the worm in its human host. The worm occurs mainly in hot countries. It is especially prevalent in Brazil and in Egypt, where it causes the so-called

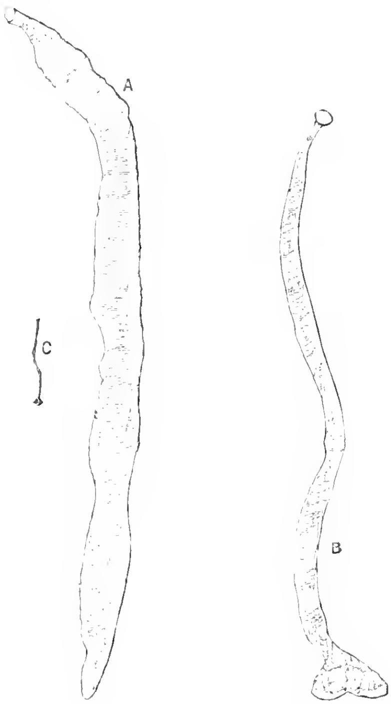


Fig. 102.—*Sclerostoma duodenale.* A. Female. B. Male. C. Actual length of parasite: C is a male worm.

Egyptian chlorosis; it is not uncommon in Italy. It was unknown in Switzerland until, during the progress of the works connected with the St. Gothard Tunnel, it was discovered to be the cause of a serious and fatal form of bloodlessness which largely prevailed among the labourers. It thus acquired a new and special interest in the eyes of Europeans.

HOW TO MAKE A TINT-REFLECTOR.

MANY persons who have a microscope, and have not got a camera-lucida or tint-reflector, very often would like to sketch what they see under the glass, when they have no means of doing so. It is for those I have written this short paper.

The cost of this piece of apparatus is but very trifling; a little skill, and any one can make it.

Get a wooden pill-box that, when the lid is off it, will fit fairly tight on to the eye-piece of the microscope (the lid I mean). Cut or bore a round hole in the centre (Fig. 103), the size of the aperture, in the top of the eye-piece. Now take two pieces of thin wood—cigar-box, for instance, does admirably—and cut two triangular pieces (Fig. 104), one side to be 45° and the other 90°. Then cut with a fret-saw a fine groove parallel to the 45° side, not too deep, on one side of each piece (see dotted line, Fig. 104). Then take some glue, and glue each triangle, with groove inside each side of the circular hole in lid, at the same time slipping in a thin glass cover between the grooves, allowing it to work freely; it should then have the appearance of Fig. 105. If this is done neatly, it will answer the purpose and requirements of more expensive apparatus; and if

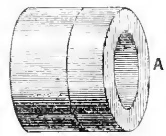


Fig. 103.

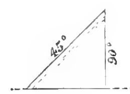


Fig. 104.

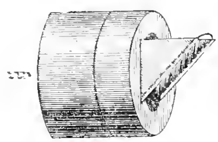


Fig. 105.

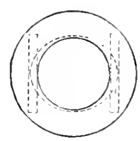


Fig. 106.

the thin cover by any accident gets broken, it is easily replaced.

By turning the lid round and substituting a piece of thin silvered glass, and using a fairly bright light, the object can be cast down on to a sheet of white paper and drawn that way; or two or more persons can examine the object at the same time. After use the cover can be slid out, placed in the box, and shut up. Fig. 106 is an end view: the outer black circle is the box, centre circle the round hole. The dotted lines show about the position the triangular pieces of wood should go.

P. S.—I have not given any measurements, because variation of size of eye-pieces prevents me doing so.

Croydon. HARRY D. GOWER.

DR. D. DRAPER shows that pneumonia is nearly always coincident with a high percentage of ozone in the atmosphere.

SIR WILLIAM JARDINE'S famous collection of birds was sold at Leicester Square on June 17th. Most of the type-specimens were secured for the British Museum and the Cambridge University Museum.

A MONTH WITH THE SQUATTERS OF WESTERN VICTORIA.

By Dr. J. E. Taylor, F.L.S., etc.

DURING a four or five months' tour in Australia last year, in the colonies of South Australia, New South Wales, and Victoria—a tour that was full of delight from the beginning to the end—nothing stood forth more prominently than a few weeks spent among the Victorian squatters.

These men are either the original settlers in the country, or their fathers were. They came out from the old country when the voyage occupied six months, when mails only arrived once a year; when the country was a dense forest peopled by hostile blacks; and it is almost impossible to imagine that, in Victoria at least, such a state of things existed only half a century ago. The law of natural selection has been in operation in Australia—only the boldest, most adventurous, and strongest men would emigrate to that far-off land. Around the firesides I heard numerous stories, often quaintly told, of the old settling days, when the narrators first "came out"—of their fights with the blacks, the loss of their sheep from famine and drought, of the long hours of hard work in the sheep-shearing and lamb-marking seasons, or when the wool was shipped or the carcases boiled down for tallow.

That is all a thing of the past. The squatters now live in magnificent houses, are well supplied with domestics, and own splendid horses. I stayed at some of the houses, which had cost £30,000 to build, which were lighted with gas manufactured on the premises, were furnished with cold, hot, and vapour baths, possessed billiard-rooms, studies, &c.; green-houses or *glass*-houses alone were absent—they were not required, for Nature produces nearly everything out of doors.

A wonderful country this Western Victoria—rightly named "Australia Felix" by Mitchell, the first explorer. Practically it is an enormous plain, underlaid with partly decomposed volcanic rocks, which latter are well known to weather into the richest soils in the world. This green plain is dotted with timber growth (formerly it was densely forest-clad); millions of dead trees, ring-barked to kill them, occupy the ground everywhere. They are vegetable ghosts, black and white—all of them dead gum-trees. These trees are evergreens, and their bark comes off in stringy patches, so that the ground beneath is strewn with dead leaves and bark, and nothing can grow. But as soon as the trees die and the leaves and bark cease falling, grass springs up in abundance, and there is good feed for cattle of all kinds. So the trees are left standing, dead; and they are the most prominent and monotonous objects in the modern Australian landscape. By-and-bye they will get fewer, for they now form the coal-mines of Victoria. Everybody uses wood for fuel, and these dead gum-trees supply the market.

The use of wood fuel in Australian houses—especially in the large halls of the squatters—gives a very quaint and even antique aspect to the rooms, for the fireplaces are made very large, and resemble the old-fashioned "ingles," where the bairns could creep in and roast potatoes. Great logs of gumwood burn in a white-washed brick hearth, and give out an aromatic odour I shall never forget. These great Australian wood fires seemed to me to be highly conducive to home enjoyment.

It was what they called *winter* in Western Victoria when I was there—answering to our January and February. But huge camellia trees, twenty feet high, were covered with flowers, all growing in the open air. Myriads of other flowers were in bloom, and on very sunny days the paddocks were quite sheeted with them.

Winter though it was, the grass was as green as with us in April. In the early summer the grass grows so rapidly and so tall that you cannot see the sheep feeding in it. There is then a difficulty in feeding it down; and when it gets woody and dry this tall grass is very dangerous. It soon takes fire, and great and terrible bush fires occur every year.

The district I visited was between the towns of Colac and Warnambool—a tract about eighty miles long and fifty or sixty wide. But this is only a fragment of the pastoral country, all of which bears the same physical character.

From out this great fertile plain there rise numerous hills, greened to their very summits—all of them extinct volcanoes. The highest of them is about 600 feet. I ascended one of these at Camperdown, and counted from the top no fewer than twenty-one volcanoes. Mount Buninyong and Mount Warrenheip, near Ballarat, were quite plainly visible, and yet they were sixty or seventy miles away as the crow flies. On the other hand, I looked towards the Coast Ranges, eighty miles away. So that, thanks to the marvellously clear and dry atmosphere of Australia, I could thus take in, on the right hand and the left, a circle of view whose diameter was 150 miles.

I stayed with several squatters in the district. They drove me from one place to another, and left me there. Never was prince more welcome! People in England have very little idea of the luxurious comfort and refinement to be found in the home of a Victorian squatter. For a *home* it is, in the best sense of that sanctified word. I had always pitied the Australian squatters as men exiled from the world and doomed to spend their lives "in the bush," until I became their guest. Then I wished that I also were a squatter! But, fortunately or unfortunately, I have devoted my life to fossils and plants, and natural history odds and ends, which don't pay; and the squatters have devoted themselves to merino sheep, which do pay!

I was much impressed with the genial and generous hospitality of the squatters I met. Many of them were distinguished by a genuine love of art, of science, and of literature. Not a few displayed a remarkable intellectual resiliency. They all looked like prosperous men, and they behaved as such. Their rosy faces and cheery juvenile laughter were indicative of happy lives spent in the open air. And such open air! I fervently wished I could export some of it to dear old England, for the benefit of the toiling multitudes in our factories, foundries, and mines.

Even in Victoria there is yet land to be cleared. A belt of untouched forest land extends along the coast from Geelong to Warnambool, a distance of about 200 miles. Only a few settlers have as yet invaded this unknown region from the landward side. The main area is still as wild and primeval as if white men had never landed in Australia. The wild dogs (dingoes), kangaroos, and emus still hold this almost unassailed natural fortress. It is almost their last refuge in Victoria. In a few years they will have joined the mysterious group of aboriginal animals which have become extinct within the period of written history.

I had the satisfaction of spending a few days in the forest, and of seeing the process of "clearing" going on. It is good for one to come out into a district like this, and to learn how much has to be done before wild nature becomes docile and tame—how the trees have to be felled, ring-barked, burnt, and stubbed up; how the swamps have to be drained, and roads made; and how there is nothing else which can do all this except strong human hands, moved thereto and supported in the often disappointing work by still stronger faith and perseverance!

Our own country underwent the same kind of clearing in the early days of Saxons and Normans, as we may see in Kingsley's "Hereward the Wake," and Green's "Making of England;" and I could quote passages from both books concerning the forest-clearing of ancient England which would apply almost unaltered to modern Australia.

The friend with whom I stayed had just enclosed about one hundred square miles of the forest, and the fencing alone had cost £80 a mile. Now it is all easy work to fence and clear, for there is no native difficulty to contend with. But in the ancient history of the colony (less than fifty years ago) all this had to be done in the midst of hostile natives.

Moreover, the squatters do not get it all their own way, even though the blacks do not interfere. If Englishmen cannot find natural enemies to fight against, they create artificial ones. Anyhow, they must be fighting! For instance, there is the rabbit—a poor inoffensive animal, which in England has to be protected by an extension of the Game Laws. We are apt to smile at such a creature being dangerous, for we think of its diminutive burrows, although we also remember its liking for young corn crops. But a person can form no idea of the destructiveness of the rabbit until he goes to Australia. A reward of £10,000 has been offered for the best means of exterminating it. Three rich and powerful Australian colonies are engaged unsuccessfully in the task. And yet the man who brought out the first brace of rabbits is still alive to see the results of his own mistaken zoological benevolence.

Poisoning, by means of phosphorised grain, is found to be the most effective means of keeping the rabbits down. One of the squatters at whose station I was visiting told me he had poisoned 4000 in a paddock of 600 acres in the space of four days. Indeed, the rabbit war is costing Australia as much as a little Russian war would. The rabbit can breed all the year round in that country, for the climate allows it, and there is a superabundance of food. In Europe it is limited to from six to nine months, and here it has numerous natural enemies to keep it down. I was not more completely astonished at the Antipodes by anything than the remarkable manner with which the introduced rabbits have adapted themselves to their new environment, and have utilised their new experience. With us in England the rabbit lives rather a humdrum kind of life—in Australia it has the world to choose from, and it usually chooses the better part. In this country the rabbit is a steady-going, unalterable Conservative—in Australia it is an out-and-out Radical, going in for new measures and new habits almost every day. It may sound very much like drawing the traveller's "long-bow" when I relate that in Australia the rabbits climb walls (built at enormous expense under the delusion that they were "rabbit-proof"), and that they run up and hide in the numerous hollow trees as if they were opossums; that they, so tender of wet feet here, in Australia have overcome the prejudice, and take to the water and swim across rivers like water-rats. But every Victorian squatter will bear me out, that such is the way in which the rabbits of his colony comport themselves.

Whilst I am speaking of the singular way in which the rabbit has changed, and is still engaged in changing, the habits of its kind, it may not be out of place to offer a few remarks on other natural history variations which are also going on. We have so long held the notion that what we call *instinct* never changes, that we are surprised to hear of our familiar English wild animals learning new habits in new countries. All of these facts are of the intensest interest to the naturalist. In them he sees the processes of evolution and natural selection still going on.

Cerebrally demoralised as English sheep and cattle have been, because man has taken care of them instead of leaving them to themselves, in Australia it is remarkable how they also have learned

to adapt themselves to the new fodder and other plants. They know the naturally poisonous Australian plants, such as the creeping Euphorbia, now as well as their ancestors knew the poisonous plants at home. At first they ate all the plants they came across, and many died, but they soon learned to discriminate. Now if any sheep or cattle die from eating poisoned plants, it is sure to be the young or the newly imported ones. Again, the thistle (originally introduced by an over-patriotic Scotchman) has spread all over the colonies. At first it was a new terror—even yet this idea has not disappeared. But sheep and cattle have learned that the *heads* of the thistle (the receptacle) are nutty in flavour and nutritious; and I was told that in seasons of drought, and consequent vegetable dearth, the much-despised thistle now annually saves the lives of thousands of cattle and sheep.

One is not much surprised that such a traditionally cunning animal as the fox has likewise changed his habit. The universal tradition of the world, civilised and uncivilised, has always represented him as a zoological "Vicar of Bray." Of course he does not belong to Australia—he was taken there, like Samson, to make sport for the Philistines. But he has changed a good many of his old-fashioned ideas and tastes out at the Antipodes. He now prefers young lambs to poultry, and he even allows the rabbit to go scot-free. He thinks the latter is too much trouble to catch, and that it is not worth much even when caught. Consequently, the English fox is assuming the natural propensities of the dingo, or native wild dog, to which he is nearly allied.

English hares have also been introduced into the colonies, and they have shared in the general zoological changes. I saw individuals which weighed sixteen pounds—and from twelve to fourteen pounds is a common weight for them to attain. Nobody eats rabbits in Australia—except in the cities—they are regarded as we regard rats, as vermin. Few people even eat hares, but they are occasionally consumed in the form of hare-soup. But not only has the English hare increased in size and weight, but also in its reproductive powers. It often brings forth five and even six leverets at a birth. When hunted it takes to the earth—thus in various ways approximating to the habits and natural history of its kinsman, the rabbit.

Even the European honey-bees, which have been introduced into Australia—and which have crushed out or are crushing out of existence the native bees, as surely as white men have replaced the blacks—have partaken in the universal change. They are there running quite contrary to Sir John Lubbock's and Grant Allen's ideas, as to their frequenting only the latest evolved and the most highly specialised of flowers. With them in Australia, matter-of-fact is overcoming their traditional botanical æstheticism. There they visit the flowers of grasses, unattractive though they are, for the sake of their abundant pollen. Perhaps, at some distant period, the floral characters of the Australian grasses may be altered or modified, in consequence of thus being unexpectedly fertilised by insects, instead of by the wind as they usually are!

And, speaking of grasses and plants, I could not help noticing that a *vegetable* invasion of Australia has taken place *pari passu* with that of white men, sheep, cattle, rabbits, foxes, sparrows, turkeys, etc. A crowd of vegetable new-comers, of no economical importance, are competing for the mastery everywhere. All of them are vegetable emigrants. Some of them may have been introduced intentionally by man, but it is certain others have not. Thus everywhere in pastures there is the milk thistle (*Silybum marianum*), somewhat rare with us—overrunning everything in rich Australian pastures, and only eatable by pigs; also clover, trefoil, nettles, daisies, dandelions, chickweed, Cape-weed (the latter covers thousands of square miles alone, especially in South Australia), stork's-bill, goat's-beard, mallow (which latter has brought its own vegetable parasite, *Puccinia malvaccarum*, with it), and many others, too numerous to mention. The introduction of plants, shrubs and trees has reacted on the habits of the native birds. Many of the parakeets—which are usually grain-feeders, or honey-suckers from the cups of *eucalyptus*—now attack the cherry orchards. The cockatoos—especially the common white ones—have manifested a strange love for the chick-weed, and they devour it greedily, and put themselves in peril to obtain it, although they seem to have learned the distance to which a gun can carry as well as the English rook.

ABRUS PRECATORIUS: A LEGUMINOSE.

THOSE who have visited the Indian and Colonial Exhibition, or, as it is barbarously called, the Colinderies, will no doubt have noticed in a number of different courts a curious pea-like seed of a light red colour with a black patch; in one court I noticed a number of caps and ornaments made entirely out of the seed of *Mimosa glauca* and this red seed, which has for its scientific name that of *Abrus precatorius*.

But this is not the only name which will be found on the different specimens; some have the name of Reglion sauvage, cascarella, jequirity seed, snake's-eyes—and in fact the names are legion, but they are all applied to the one seed *Abrus precatorius*, called precatorius because it is much used for Roman Catholic rosaries in some parts of the world.

This seed is that of a plant which once had a name for curing certain diseases of the eye, but I believe there is not much foundation for this reputation.

The plant is a deciduous climber, and has pea-like flowers of a reddish-purple. A specimen two years old may be seen at Kew, but it has not yet flowered.

On chewing the leaves, which are composite and much like those of the acacia, a sweetish liquorice-like taste will be noticed; it is in fact called the wild liquorice, but must not be confounded in any way with the liquorice plant (Glycyrrhiza) of the British Pharmacopœia, though they both belong to the same group of plants.

CHAPTERS ON ANIMAL PARASITES.

By W. A. Hyslop.

No. IV.

To resume our brief classification of these interesting objects:—

3. Akidoproctus.—There are but few species of this genus, and they are easily distinguished by the curious indentation in the fore-part of the head (see Fig. 107).

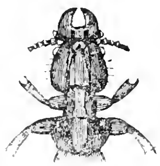


Fig. 107.—Head of Akidoproctus. × 20.

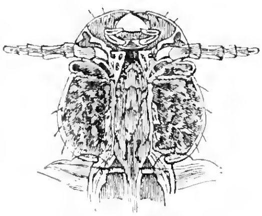


Fig. 108.—Head of Ornithobius of Swan. × 60.

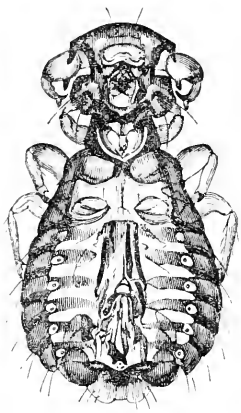


Fig. 109.—Goniodes of Peacock, ♂. × 20.

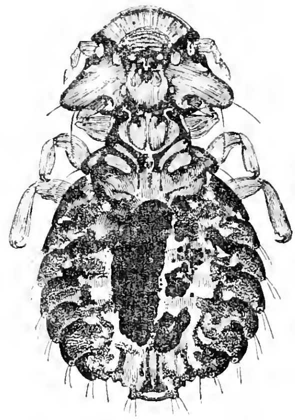


Fig. 110.—Goniocotes of Impeyan Pheasant, ♂. × 20.

Curiously, the root of this plant is poisonous, and has often been used by the convicts in Mauritius, both by rubbing it in their eyes and chewing it, to induce illness. Another most interesting fact about this plant—or rather the seed—is that the natives of the country in which it lives found out that all the seeds weighed precisely the same (about five grains, I should say), so, as they had no other standard weight they instituted these seeds as a standard weight, and called each seed in their own language a carat; and this carat is in fact the origin of our carat weight of gold.

This fact alone made the seed one of interest to me, and, combining it with the fact, that it belongs to one of, if not the most important order of plants of economic value, makes me think that there may be others like myself, who, being ignorant of the above facts, will be glad to know them.

Whitmore Wells.

Hyphæne, a small genus of African palms, is remarkable for having stem branched. The gingerbread tree of Egypt (*H. thebaica*), doum or doom palm, has a stem frequently three or four times forked or branched in old trees, though when young it is always simple. A. Smith, who is my authority for above, states that this genus is confined to the African continent.—*J. Christie.*

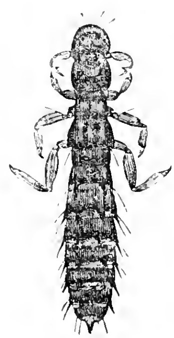


Fig. 111.—Lipeurus of Tragopan, ♂. × 20.

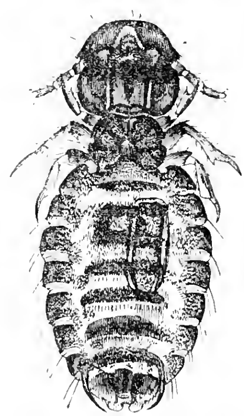


Fig. 112.—Trichodectes of Horse, ♀. × 60.

4. Ontocophorus.—This genus forms a link between the Decophori and Nirmi, and the species are difficult to distinguish, some being very like the former and others like the latter. There are only about six species known.

5. Goniodes.—The parasites of this genus are of large size, with a broad thorax and abdomen, and have as a distinguishing feature the antennæ cheliform in the males (see Fig. 109), the first joint being large

and thick, the third considerably smaller and recurved towards the first, and the fourth and fifth very small and rising from the back of the third. The females have the antennæ simple, and are apt to be confused with the next.

6. Goniocotes.—This genus is like the last, but the antennæ are simple in both sexes, and the base of the head is of a different shape (Fig. 110).

7. Lipeurus.—The species of this genus are the most graceful of the Anoplura, being as a rule long and slender (see Fig. 111). There are some exceptions as regards the shape, as for example *L. taurus*, from the albatross, where the abdomen is broad and short. Some species are not unlike the Nirmi, but are distinguished by the males having the antennæ cheliform like the Goniodes, while in the Nirmi the antennæ are simple in both sexes.

8. Ornithobius.—These are generally of large size, and easily distinguished by the structure of the head (see Fig. 108).

Trichodectes.—All the foregoing genera are confined to birds, but we now reach one of the only two non-blood-sucking Anoplura found on mammals. The antennæ are three-jointed, and the abdomen as a rule broad and short; *T. sphærocephalus*, from the sheep, is however a notable exception, the abdomen being long and narrow. Nearly all our Mammalia have a species peculiar to themselves, and are often found in large numbers.

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

Adulteration.—Much domestic alarm was created, about sixty years ago, by the publication of a book with the sensational title of "Death in the Pot," to which Hassall's "Food and its Adulterations" was a natural successor, and as near an imitation as the altered state of science permitted. According to the writers of such treatises, nearly everything we eat and drink is more or less adulterated and poisoned. A great deal of misery has been suffered in cases where people afflicted with vivid imaginations and highly nervous temperaments have studied such books. These unfortunates, who above all others require to "eat, drink, and be merry," have aggravated their natural morbid tendencies by semi-starvation and continual watching of the effect of dreaded poisons supposed to be contained in their daily food. The adulteration panic-mongers maintain that the progress of science continually multiplies the means of adulteration, and that its amount increases accordingly. If this were true, the rate of mortality should increase with the progress of science; but, as we all know, the contrary is the case. Some years ago I gave much attention to this subject, beginning with grave suspicions of the heartless atrocity of food and drug concocters and purveyors, and ending with the conclusion, that the adulteration of fact by those who traded on death-in-the-pot panics was far greater than the adulteration of food. The alleged adulteration of tea with iron filings, for example, I proved to be a pure fiction altogether, originating in the ignorance of the analysts, who, finding magnetic particles in the ashes of tea-leaves, assumed that they were filings of iron fraudulently introduced. The fact is that tea-leaves naturally contain iron, the tea-plant thrives only on ferruginous soils, and, when the leaves are burned, their carbon reduces the iron salts to the condition of magnetic oxide, this black oxide being the supposed filings. In China iron-filings are dearer than tea-leaves, and in England there is no such market for them as must be created if they were used as described. I could easily multiply similar instances.

The worst adulterations that actually do occur are perpetrated on goods that are beyond the reach of the Act of Parliament, viz. on woven fabrics. Calicoes are limed, silks are loaded, and woollens are shoddied with impunity; the general result being that throughout the world the reputation of English manufactures, once so high, has now sunk to the lowest commercial level, and the swindlers who have brought this about are making the loudest complaints about the depression of trade, and asking for protection against the successful competition their own dishonesty has created.

Poisonous Codfish.—Nearly connected with the above is the recent poisoning of French troops in Algiers, which Dr. E. Bertherand has investigated It is attributed to the eating of dried codfish which had a vermilion hue, owing to the presence of a fungus, described by M. Mégnin as *Coniothecum Bertherandi*, but apparently the same as previously known under other names, such as *Clathrocystis roseo-persicina*, *Sarcina morrhuæ*, and half a dozen more. A few years ago, during a short sojourn at Boulogne, I visited some of the French fishing-vessels then returning from the neighbourhood of Iceland, where they compete with the Norse cod-fishers of the Loffodens and thereabouts. They leave Boulogne about mid-winter, and return in August. I noticed particularly the red tint of most of the dried fish they brought home—a colour quite different from that of the hundreds of tons of dried cod I had previously seen in Norway, which has a drab colour when dried. This leads me to suspect that the mode of curing has something to do with the production of the red fungus.

The Norwegians have two methods of drying—one by spreading the split fish on the rocks—the fish thus cured are called "klipfisk;" the other method is to tie two split fish tail to tail and hang these pairs across sticks arranged horizontally in the drying-grounds. These are called "stokfisk," i.e. stickfish.

Acres and acres are to be seen covered with the fish thus drying.

From what I could learn from the French fishermen, they dry their fish on board, and what I saw of the ships by no means excited admiration of their cleanliness. If a fungus of any kind should be started among fish thus cured and thus stored, it would spread rapidly, the ship would be stocked with spores ready to propagate on the arrival of each cargo. The Norwegian fish after drying are stacked in the open air at the fishing-station; then in like manner on the "yechts" that carry them to Bergen, then in the wharfs at Bergen, from which port they are shipped to their final destination—Spain, Portugal, and Mediterranean Catholic countries, where they are purchased for consumption on fast-days. These stacks appear from a short distance like hay or corn ricks.

THE FLUIDITY OF METALS.—Prof. W. Spring, of Liège, has for some time past been engaged in a very interesting series of experiments which prove that metals are not solid, and throw considerable doubt on the solidity of everything. Fluidity is simply the property of yielding to pressure in such a manner that the matter in question shapes itself in accordance with the pressure, by the movement of itself upon itself. When water "finds its level," it is simply yielding thus to the pressure of its own gravitation. When it fills a cup or other vessel it is shaping itself as above described, and thereby attaining equilibrium.

Spring's experiments show that metals, in what we call the solid state, flow in like manner, provided the pressure is sufficiently great. By mixing copper-filings with zinc-filings, and submitting them to a very great pressure, he obtained a lump, and this lump was not a conglomeration of zinc and copper particles, but a true alloy, a piece of brass such as he would have obtained had he fused the materials together in a crucible. Bismuth melts at 512°, cadmium at 442°, and tin at 451°; the mean of these is 468°; but if these metals be melted together in the proportions for making "Wood's alloy," we obtain a silver-like metallic substance that fuses at 113°, or 99° below the boiling-point of water. By mixing filings, of these metals together in the same proportions, and submitting them to a pressure of 7500 atmospheres, M. Spring obtained this alloy, with its low melting-point. By squeezing together in like manner a mixture of powdered sulphur and metal filings, he obtained true sulphides of the metals, i.e. compounds which had lost the properties of both the sulphur and of the metals, and had acquired new and special properties peculiar to themselves.

In the course of a recent lecture at the Royal Institution on "Certain Properties Common to Fluids and Solid Metals," Professor Chandler Roberts Austen described these experiments, but he does not appear to understand the cosmical bearings of the results, which I pointed out in the "Gentleman's Magazine" of Feb. 1883, viz. that they settle the much-disputed question of the fluidity or solidity of the interior of the earth and other similar planets. The pressure of 2000 to 7500 atmospheres used in Spring's experiments is attained at only a moderate depth below the earth's surface—moderate, I mean, in comparison to the earth's diameter. As these and vastly greater pressures are reached, the fluidity of the materials of the earth must be attained, whatever be their temperature. If this is high, as our borings and sinkings suggest, the pressure demanded to produce interflow is proportionally less. Spring found, that at 2000 atmospheres pressure lead-filings became united to an uniform block, and at 5000 atmospheres "it oozed out at all the points of the apparatus as if it were liquid."

In round figures this pressure of 5000 atmospheres is reached at 50,000 feet below the earth's surface, or more than double this pressure at 100,000 feet, and 100,000 feet is not quite 19 miles, or less than $\frac{1}{400}$ of the earth's diameter. This would be represented on a twelve-inch globe by a thickness of $\frac{3}{100}$ of an inch, or that of a stout card. What must be the pressure, and how complete the fluidity, when we descend to a depth comparable to the relative thickness of the rind of an orange? Is it at all surprising that lava, i.e. fluid rock, should squeeze out of the joints of the earth's crust, as the lead from the joints of Spring's apparatus?

THE PLANET NEITH.—Seven times has a telescopic body been observed near Venus in such a position as to suggest that it is a satellite to that planet. Mr. J. C. Houzeau, of the Brussels Observatory, has collated these observations, and finds that they do not accord with the satellite theory, neither do they agree with the supposition of an intra-Mercurial planet. He finds that they may be explained, by supposing the existence of a small planet that travels in an orbit about equal to, or a little larger than that of Venus, and that it comes in conjunction with Venus at intervals which are multiples of a little less than three years; those between the seven observations corresponding to such a period. M. Houzeau proposes the name of Neith for this hypothetical planet.

OVER DRAINAGE.—Mr. M. C. Read has lately read at the United States Department of Agriculture a series of papers on "The Proper Value and Management of Government Timber-Lands," in one of which, read in May last, he shows that more harm than good has been done by the vigorous proceedings of the last twenty-five years in the draining of swamps. These being generally on high ground and at the same level as the surface of adjoining lakes, the drainage is easily effected by deepening the outlets of the lakes, and, when necessary, also straightening and clearing the streams below, which carry off the

water. This promotes the rapid concentration of the water into the larger streams. Mr. Read says that, "all three agencies combined are making the surface drainage almost as perfect as if a series of impervious roofs covered the land, and all the flow from them were conducted by pipes into one common channel." Consequently "springs once copious have disappeared, streams formerly perennial alternately overflow their banks and run dry. The natural regulators of the streams having been destroyed, whenever there is excessive rain it is rapidly carried into the streams, which, gradually uniting their waters, often constitute floods in larger channels which no human appliances can control." The remedy proposed by Mr. Read is re-foresting the swamps and the higher lands surrounding them and the lakes, as well as restoring the lakes to their former dimensions, or increasing them wherever practicable, by raising the outlet level. A scheme kindred to this has been proposed for creating artificial lakes or reservoirs at the sources of rivers, as at the sources of the Ohio in the Alleghany Mountains, by damming up the ravines of the smaller streams.

We have made such reservoirs in many parts of Britain, but of course all our operations are on a much smaller scale than those of our big children over the water. The "compensation ponds" in the Pentland Hills, and the reservoir for supplying Edinburgh, are examples among many others. Our experience at Sheffield, on March 11, 1864, shows the possible danger of large-scale operations of this kind. The Bradfield reservoir, having an area of 76 acres, and holding 114,000,000 cubic feet of water, burst through its embankment six miles above Sheffield, the flood sweeping all before it from the confluence of the Loxley and the Rivelin to the Don. Nearly three hundred people were killed, and property to the value of more than a million sterling was destroyed.

If the like should happen to the big things proposed in America, the result would be proportionate in magnitude, though not likely to be equally disastrous, on account of the sparsity of population over there.

THE FLOODS OF LAST MAY.—Generally speaking, ours is not a land of floods, one reason being that the deep soil so largely prevailing acts as a flood moderator. In countries like Spain, where there are great areas of bare or nearly bare rock-slopes, many rivers are roaring, overflowing torrents in wet weather, and quite dry at other times. It is possible that we may be over-draining, as the Americans have been, and that our recent liability to floods has been thereby induced. At the last meeting of the Meteorological Society, June 16, Mr. W. Marriott read a paper on the floods of May connected with the heavy rains between the 11th and 13th. At Worcester the flood was higher than any that have occurred there since 1770. The West and Midland counties suffered generally in like manner. At Shrewsbury the Severn rose 16 feet above average summer level, and at Worcester 17 feet 1 inch. At Ross, on the Wye, the flood was 14 feet. At Nottingham the Trent rose 12½ feet; at Rotherham the flood was 8 feet 5 inches; and in north-east Yorkshire the Derwent rose nearly 11 feet above summer level. Great damage to property was caused by these floods, and considerable loss of life; bridges were washed away, railway traffic suspended, and ordinary business seriously interrupted. In some places the waterworks were flooded, with the paradoxical result of cutting off the water-supply to the towns.

MOUNTAIN OBSERVATORIES.—In 1858 Piazzi Smyth, Her Majesty's Astronomer for Scotland, published a very interesting book entitled, "Teneriffe: an Astronomer's Experiment." This experiment, made during the summer and autumn of 1856, consisted of erecting an observatory at a great elevation, and making astronomical and meteorological observations there. The height of the observatories in this case amounted to 8900 feet at one station, and 10,700 feet at the other.

Piazzi Smyth was thus the pioneer in the work of high-station astronomy and meteorology, which have now become greatly developed; but among the admiring accounts of such work that I have seen I do not find a fair acknowledgement of his priority, and his practical demonstrations of the advantages of such observatories. The latest of these is one in course of erection on the Sonnenblick, 10,170 feet high (Tyrolese Alps). This is the highest now in Europe, where there are about a dozen others at elevations of 4000 feet and upwards. The highest in the world is that of Pike's Peak, Colorado, 14,134 feet. The majority of these are only meteorological observatories. Piazzi Smyth combined astronomy and meteorology, and by selecting Teneriffe, on an island so far out at sea and rising so sharply from it, obtained at a given elevation far greater freedom from dust-haze than is possible at any of the inland observatories.

SPOTS ON SYCAMORE-LEAVES.—W. B. Drummond will find an answer to his query in SCIENCE-GOSSIP for October 1884, where it is said: "The black spots and patches on the leaf of sycamore have been caused by drops of rain or dew acting as sunburners by condensing the solar rays." I think I have myself noticed those spots on the leaves of some other tree, though I cannot at present remember which. It would, however, be interesting to know, as Mr. Drummond suggests, why they are confined altogether or for the most part to the sycamore or plane-tree.—*J. Muir*, *Glasgow.*

SYCAMORE SAMARAS.

By Edward Malan, F.L.S.

SOME time ago* a charming paper appeared in these pages on "Frog-Spawn," which led me last year to make similar observations on the seeds of the common sycamore (*Acer pseudo-platanus*).

Every one is more or less familiar with these brown winged seeds, which strewed the March meadows. They are one of the surest signs of spring, and a basket may be filled with them in ten minutes. Wherever the storms of winter have blown them, wherever there is a pennyworth of soil to be found, by windy copse, by silent stream, by dusty roadside—there, in countless numbers and all unnoticed, their struggle for life begins. And it often is a hard struggle. For one seed that survives, how many millions must perish? Browsing animals, hob-nail boots, unkind fate, and death in a thousand shapes, meet them at every turn. Therefore what can I do better, a bachelor, in the kalends of March, than rescue one of these seeds from oblivion?

Throughout February, unless the weather is very mild, the seeds remain, as they have remained since

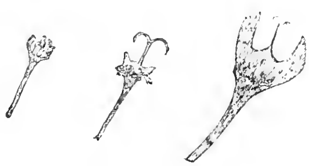


Fig. 113.—Flowers of Sycamore.

November, *in situ*. There is no life visible—no promise, but only the uncompromising dry husk of things. About February 25, however, Nature, re-orient out of dust, turns in her sleep, and a tiny root, yellow and yellower at the tip, emerges, feeling faintly after the sunny earth.

Now just please go out, and select some of these seeds, and watch their growth. You will find them singly or in pairs. Every individual seed, with its wing extended like the wing of a moth, is called a *samara*. If the seeds are joined in pairs, the first thing to notice is that they are attached nose to nose in an affronted position. Place a pair of these seeds in the sun on damp earth under a bell-glass. In a few days they will begin to separate (Fig. 115), and it will then be plain that the nose of each seed is seamed with a longitudinal slit or suture, like the hilum in the common bean. Each eed is attached to the peduncle or flower-stalk by a slender thread, and the remains of the pistil appear between. Even in so simple a thing as this attachment of the seeds to the stalk, great Nature has displayed a wonderful deal of skill and forethought. The threads start from the stalk, and extend to the point of the suture farthest from the stalk, forming an outline like the letter M. By this means the sap flows into the wings up the length of the suture, and the root is able to emerge at the point nearest the peduncle. If the threads were attached elsewhere they would interfere with the escape of the root, less sap would be supplied, and the means of attachment would not be so secure.

In three or four days (Feb. 28), the root becomes

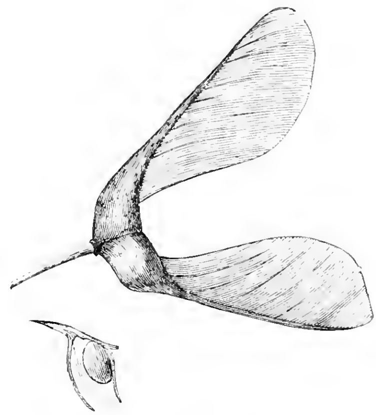


Fig. 114.—Wings of Samara, brown on Sept. 4, 1884.

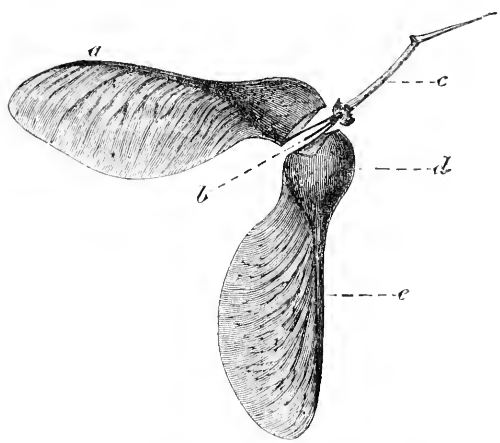


Fig. 115.—Samara of Sycamore (*in situ* Feb. 19, 1885): *a*, samara; *b*, pistil, *c*, peduncle; *d*, capsule; *e*, pteridion.

pink near the hilum, and a furry haze of microscopic rootlets appears. Growth then proceeds rapidly. By March 7 the seed-leaves or cotyledons are visible, and the head of the capsule, lined with fine hair (*simarre*), ruptures along its proper lines. In a few more days (March 11), the cotyledons, which are carefully wrapped up in a tunic, are free and creased, and the capsule and tunic are no longer needed. The method of folding the cotyledons is very clear. They are folded up so as to occupy least space, i.e.

* March 1882.

first fold in half and then in half again, like a ribbon reduplicate, and not coiled round (*circinate*), like a fern-frond, which grows later in the season, and requires less protection. By March 18 independent existence begins, and the young sycamore is possessed of two green cotyledons, a pink stem, a tap-root, and rootlets. This is the most dangerous stage of growth, for the plant is tender, and foes are many. If it survives, however, the first pair of real leaves, which are serrated, appears about March 27, and the young

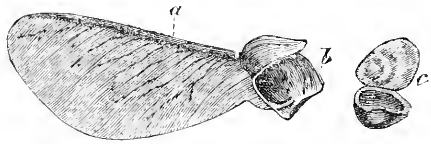


Fig. 116.—Single Samara, further developed (March 1, 1885): *a*, pteridion; *b*, simarre; *c*, tunica.

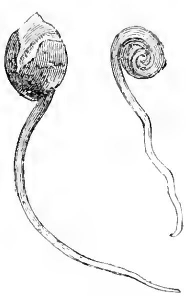


Fig. 117.—Young Seedlings of Sycamore (Mar. 13 and 20, 1885).

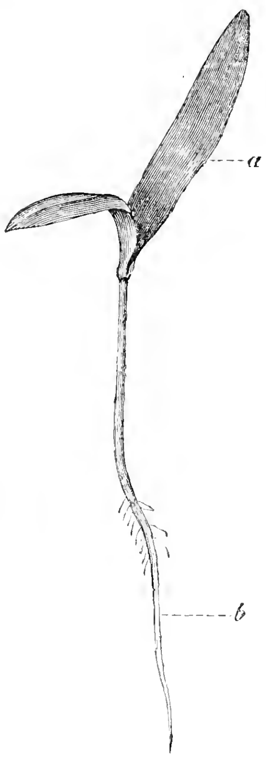


Fig. 118.—Ditto, further advanced (March 18): *a*, cotyledon; *b*, tap-roots.

tree continues gaily enough until, by the end of May, solid wood is formed. Through June the growth solidifies, and proceeds less slowly, till by the middle of July the tree has obtained its ultimate height for the first year. The samara shown in the figures produced a tree eleven inches high by the middle of July last year. That was under a bell-glass in the sun, whereas some other samaras, also in a bell-glass, but not once exposed to the sun, had their cotyledons and first leaves still entire on Dec. 1, 1885. I have noticed that, in the same way, tadpoles in shaded pools do not develop into frogs by July.

By the end of May sycamores are flowering (Fig. 113), with large scented racemes, highly attractive to aphides and bees. The flowers have 7, 8, or 9 stamens, and a bifid pistil. As soon as the pistil is fertilised the lunation of the samaras begins, like budding horns. By July 8 the wings are full-grown, green, with a blush of pink. By Sept. 9 they are brown. On Nov. 9 the tree is destitute of leaves, and the samaras are ready for the carrier winds. How splendidly adapted the seeds are for flying it is needless to show. The wing enables them to spin with a most rapid twinkling flight, which floats them at a very acute angle. The wings of these samaras are, like the wings of dragon-flies and hawk-moths, evidently intended to float a heavy body, which fact makes up an interesting mathematical problem: given the angle of the wing, determine the weight of the body, or *vice versâ*. When lying on the ground, the beating of the rain-drops on the wing does much to alter the position of the seed.

The name samara, which is properly applied to the seed of the elm, also means a woman's long dress, light covering, or scarf. It is often spelled *simarre*, *chimarre*, or *cymar*, from the Spanish *zamarro*, a shepherd's coat of sheepskin, which is the Arabic *sammûr*, the Scythian weasel, marten, or sable. *Simarre* also means the upper robe worn by bishops, to which lawn sleeves are attached. Carlyle mentions it ("Fr. Rev.") i. 67: "One party rushed off in such haste to prepare the Archbishop of Toulouse for the king that they had to borrow a *simarre*."

As applied to the seeds of the sycamore, the term must have a double signification, referring to the long wing-like appendages and the soft furry lining of the capsule. Botanically speaking, these seeds are dry indehiscent winged syncarpous fruits. The maple and ash also have samaras. Thus the seed of the sycamore is a samara composed of a unilocular capsule opening by valves, lined with silky hair, and containing the embryo wrapped in a tunic. This seed when perfected must be dispersed, so a wing (πτερίδιον) is attached, to bear it away. The radicle emerges from the suture, the cotyledons are at once used as lungs, and the plumule starts into life.

If this paper falls into the hands of any reader near Llangollen, let him walk out for an hour or so beside the magic Dee, where it is sliding over its slabs of slate, and the water-ousels are chasing up and down. Under the sycamores at Berwyn he will have little difficulty in following the above description.

We are sorry to have to record the death, at the age of 78, of Professor King, of Galway College, a well-known geologist, and the distinguished opponent of the late Dr. Carpenter concerning the organic origin of Eozoon.

VARIETIES OF THE HONEY-BEE.

THE increase of bee-keeping, the spread of literature treating exclusively of the subject, and the attention paid by bee-keepers in Europe, America, Asia, and Africa, to the improvement of the honey-bee (*Apis mellifica*), have demonstrated that there are at least ten distinct varieties of this insect.

And, though this has occurred within the last fifteen years, no notice seems to have been taken of the existence of these well-marked races of the domesticated insect in its bearing on the theory of evolution. That interesting chapter in the history of that teaching has not yet been written, indeed, the facts summarised below are only to be found scattered over the pages of many bee-publications, some of which are difficult of access. The present paper is offered as a contribution towards that part of the natural history of the honey-bee.

American bee-keepers have set before them the project of breeding bees by a judicious selection of queens and drones, with what they consider these six indispensable qualifications in bees kept for profit: 1, Hardy; able to bear bad winters without too great dwindling. 2, Good breeders; the queens laying in abundance, early in spring and late in autumn. 3, Gentle and quiet; not attacking mankind without provocation, and allowing themselves to be examined on a bar-frame comb when lifted from the hive. 4, Good honey-gatherers; working on the flowers from sunrise till sunset. 5, Strong and active; flying long distances to pasturage, and vigorously defending their stores. 6, Long-tongued; being able to get honey from many flowers which defy most bees.

And, so far, intelligent bee-masters have been partially successful; indeed, there is every reason to expect that the honey-bee of the future will be as different from, and as much more valuable than, "the little busy bee" of the past, as an English Shorthorn excels an Irish brindled cow.

I shall now shortly mention the distinguishing feature of each of the races of bees that are known to the bee-keeping community.

1. Black or Brown.—The ordinary hive or honey-bee, called by way of distinction the black or brown, from being of almost one uniform blackish-brown colour, with slight indications of paler bands on the abdomen, and clothed with greyish-brown hairs. Till within the last twenty years, no other bee was known in north or west Europe. This is also the bee which has returned to a wild condition in the woods of America and New Zealand.

2. Italian Alp.—The Italian Alp, sometimes called Ligurian, is a native of the mountainous district in the north of Italy and south of Switzerland, round about the Lakes Maggiore and Como. It is of a light orange-yellow colour, with two deeper hued bands on the abdomen, and is longer and more slender than the black. It is a better honey-gatherer, more hardy and prolific, and very courageous in defending its hives, even from the ravages of the wax moth.

3. Cyprian.—The Cyprian is indigenous to Cyprus and part of Turkey in Asia. It is yellow, quite slender, wasp-like, and smaller than the Italian. It always has a yellow shield-mark on the back between the wings. It is strong, an excellent honey-gatherer, winters better than any other race, and is proof against being robbed by other bees; but it is easily excited and a most revengeful stinger.

4. Syrian.—The Syrian is found in that part of Asiatic Turkey which lies north of Mount Carmel. It is of the same size, qualities, and temper as the Cyprian, from which it differs in showing less yellow, and being on the whole of a greyer colour over the entire body. It is quite distinct from the next.

5. Holy Land.—The Holy Land, or, as the natives call it, the holy bee, is found in Palestine south of Mount Carmel. It is marked like the Cyprian and Syrian, but the hair is so light it appears to be beautifully banded. Its size is smaller than the Italian, but longer than the Syrian. It is very active and far-flying, a most wonderful builder of cells, has a tongue able to get honey from red clover; but is ready to sting, becomes furious at the least smoke, and runs off the comb when one is lifted from the hive.

6. Tunisian.—The bee of Tunis, in the north of Africa, is a peculiar one. It is of the same size as the Cyprian, but the colour is very dark brown, darker than the common black. It is an active worker, keeps on its combs while being handled, and bears smoke better than Eastern races; but it is liable to attack a person coming near its hive, even though it is not interfered with.

7. Carniolan.—The Carniolan is a native of Carniola, in Illyria, South Austria. It is longer and thicker than the black, being the largest domesticated European bee. The colour is a rich dark brown, nearly black; while each ring of the abdomen is clearly marked by whitish-grey hairs that give it a silvery look. It is equal to the Italian in honey-getting, fecundity, and hardiness; while it is of a remarkably gentle disposition, never attacking the manipulator except it should be treated with improper roughness.

8. Hungarian.—The bee peculiar to Hungary is of the same size as, but far blacker than, the Black. It is a very fair honey-gatherer, and as gentle as the Italian, but it has such a propensity for swarming that it is unprofitable, except the proprietor should care for many stocks and little honey.

9. Egyptian.—The Egyptian is in size like the Cyprian, but quite yellow like the Italian. It is common, both wild and in hives, along the valley of the Nile, and is famed for its good honey-gathering

and breeding qualities; but it is without exception the most ferocious bee known outside India.

10. SOUTH AFRICAN.—There is an excellent bee in the Cape Colony, the size and colour of, but a little greyer than, the Italian. It is tractable, very prolific, and of most remarkable working powers; a recent writer stating that where honey is to be gathered they keep at it early and late, and often even by moonlight.

Whilst all these races breed freely when crossed with each other, so that they cannot be regarded as separate species, they all differ in certain particulars, the most striking of which are noted above. The differences are, no doubt, the result of their being influenced by climatic surroundings, as well as in some districts of a long course of too close breeding.

Studying these ten varieties with the aid of the map of the world, it appears that the nearer India is approached so much fiercer is the temper of the bees found to be. The question then might arise, Was this the condition of the first original bee, and have her descendants, as they migrated into colder climes, lost some of that ferocity which renders the Indian bee the terror of travellers through the woods of that continent?

A point which opens a wide field of study is the colour of several races, and what developed it, and how far it is to be taken as an index of common descent; thus dark-coloured races are found in north-west Europe, Hungary, Carniola, and Tunis, where they are wide apart from each other.

It is to be hoped that before the modern bee-breeders have obliterated the old distinct varieties, those who have the opportunities will make careful coloured drawings, measurements of queens, drones, and workers, and further observations of all their pecularities. It will be too late to attend to this branch of natural history when *Apis Americana*, as we are told the new and improved bee of the "good time coming" is to be called, has taken possession of the hives of the world.

H. W. LETT, M.A.

ASTRONOMY AND METEOROLOGY.

By JOHN BROWNING, F.R.A.S.

IN the Annual Report for the Paris Observatory reference is made to the completion and success of the new apparatus for celestial photography, the object-glass of which is about a foot in diameter. Admiral Mouchez speaks of it in his report as the most notable progress made for a long while in Observational Astronomy, and adds that by the aid of instruments of this description the present generation of astronomers ought to be able to leave as a legacy to their successors the positions in the sky of from twenty to thirty millions of stars visible to the most powerful instruments.

The new method of photographic research has been used to determine the relative brightnesses of the satellites of Jupiter, and to an examination of the question of the variability of brightness of the planet Neptune, which has often been suspected, but appears to be negatived by the process, as the photographs indicate no change. The small apparatus takes stars of the twelfth magnitude with one hour's exposure. With the large apparatus stars can be taken of the sixteenth magnitude. A magnificent photograph of the Pleiades has been obtained, showing 1421 stars.

A new arrangement of the mercury trough for observations by reflection has been contrived by Mr. Gautier, which appears to answer perfectly its purpose of neutralising the effects of a tremor in the ground produced by passing vehicles, etc.

At the June meeting of the Royal Astronomical Society Mr. Cornu described a method of determining which lines in the solar spectrum are atmospheric, and which are due to solar absorption. By means of an oscillating mirror the eastern and western limbs of the sun are thrown on the slit alternately; the true solar lines appear to oscillate, while the atmospheric lines remain stationary.

The Rev. F. Howlett read a paper in which he stated, that he had not been able to detect any foreshortening of the penumbra of the spots when near to the sun's limb.

In August Mercury will be a morning star.

Venus will be a morning star.

Mars and Jupiter will be evening stars.

There will be no occultations of any stars above the fourth magnitude.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
MERCURY ☿	6	6 23M	1 3A	7 43A
	13	5 33M	0 18A	7 3A
	20	4 31M	11 31M	6 31A
	27	3 42M	10 58M	6 14A
VENUS ♀	6	1 53M	10 1M	6 9A
	13	2 6M	10 9M	6 12A
	20	2 23M	10 17M	6 11A
	27	2 42M	10 25M	6 8A
MARS ♂	6	10 52M	4 14A	9 36A
	13	10 50M	4 3A	9 16A
	20	10 48M	3 52A	8 56A
	27	10 45M	3 41A	8 37A
JUPITER ♃	6	9 11M	3 14A	9 17A
	13	8 51M	2 51A	8 51A
	20	8 31M	2 28A	8 25A
	27	8 12M	2 6A	8 0A
SATURN ♄	6	2 3M	10 11M	6 19A
	13	1 40M	9 47M	5 54A
	20	1 17M	9 23M	5 29A
	27	0 53M	8 58M	5 3A

Meteorology.—In the four weeks ending on the 10th of July the mean temperature was 58° 4', which is just about the average.

The rainfall in these four weeks was only 0·22 collectively (about 25 tons to the acre); this was a great deficiency, as the average rainfall for this month is about 206 tons to the acre.

The average temperature of August in London is 63°; on the coast it is about one degree less.

The average rainfall for August in the south of England is about 3 inches.

ENTOMOLOGICAL LITERATURE.

MUFFET'S *THEATRUM INSECTORUM.*

[*Continued from p.* 159.]

WE now come to the last class of books, in which we include all those giving accounts of individual species. Naturally the insects taken most notice of are the bees, and therefore we find frequent allusions to them among the writers of the various countries of Europe. Beginning at home, Thomas Hill, in his work on gardening,* has a chapter on bees; in Spain, Torres fills an octavo on the keeping of bees.† Some time previously, in Germany, Stanhuff devoted a whole quarto to the habits of bees, and the allegories suggested by them. ‡ Silkworms also, on account of the practical value of the silk they produced, claimed some attention, and accordingly we find Serres § at Paris and London, Libanus ‖ in Germany, and Tellier ¶ in Paris again, publishing works on their history and culture; and in London in 1609, an anonymous writer fills a large volume with the history of the mulberry tree and the silkworm.** At this time also the ants obtained a small treatise on their history by Jerome Wilde; †† Aristotle's theory about wasps was confuted in a work by Cagnatus, ‡‡ a naturalist of Verona; and a curious volume was published a little later by an anonymous writer. §§ Last, but not least, was Jacob Hoefnagel's book, called "Various Illustrations of Flying Insects, illustrated most accurately from life."* This book—which has no letter-press, and which in the copy in the British Museum forms part of a larger work on Natural History generally,—is certainly well described by the latter part of its title, for the clearness of the figures is a most conspicuous feature. The part on insects contains fourteen plates, and was published at Frankfort A.D. 1630.

We must now turn our attention again to the MSS. left by Thos. Muffet. According to A. Wood, in his "Athenæ Oxonienses," a few imperfect copies of the "Theatrum" were published by Laur. Scholzius in 1598, but of these I can find no mention elsewhere. Be that as it may, they were imperfect copies, and only one or two were printed, so the MSS. practically lay by idle until they came into the hands of Sir Theod. de Mayerne, who published them at London in 1634, under Muffet's orignal title of "INSECTORUM SIVE MINIMORUM ANIMALIUM THEATRUM." Thus we see, with the appearance in print of this book, Conrad Gesner's writings on insects at last saw the light of day, about a century after their origin, and after passing through many vicissitudes, having changed hands as many as five times. Such was the struggle this our study went through in its early days.

Thomas Muffet has well been called the father of Entomology, and certainly he did a great deal for this particular branch of Natural Science, for his book is most comprehensive, containing as it does a history of each order of insects, and recapitulating everything that had been discovered on the subject previously. We must remember also, that to compile a work like Muffet's was no light task in his day; it would no doubt require endless research in numerous foreign libraries to obtain the various authors he quotes from; for books, as we know, were very few and far between in those times, very different from our own, when we can get almost any volume we may desire in our large public libraries. Muffet enters most thoroughly and heartily into his work, he is not content merely to record the few bare facts he could glean from previous authors concerning the different species of insects, as other writers had done before, but in each case, by means of his own and his friends' observations, he strives to arrive at a practical reason and definite use for all the phenomena he observes. True, his conclusions may not have been entirely correct, but even then they formed a basis from which subsequent investigators could start with additions and corrections, till at last the amount of certain knowledge which we possess at the present day has been arrived at. I may here mention a statement of Muffet's which, though a gross error, speaking generally, has had a long-lived reputation. He says that when the pupa changes into the imago, the head of the pupa becomes the tail of the imago,

* A Briefe Treatyse of Gardenynge; teaching the apt dressing, sowing, and setting of Gardens, with the remedies against such beastes, wormes, flyes, etc., that commonlye annoye gardens. To this is annexed the maruelous gouernement, propertie, and benefite of the Bees, with the rare secret of honey and of the waxe; in 4to, London, 1574, etc.

† Tratato de la cultivacion y cura de las colmenas; in 8vo, Alcala, 1586.

‡ Orat. de principiis proprietatibus apium et allegoriis quae in harum contemplatione occurrunt: in 4to, Vittenb., 1556.

§ La Cueillette de la Soie pour la nourriture des vers qui la font; in 8vo, Paris, 1599.

‖ Historia Bombycum, in 8vo, Franckf., 1599.

¶ 1. Brief discours concernant la manière de nourrir les vers à soie; in 12mo, Paris, 1602. 2. Mémoires et Instructions pour l'establissement des mûriers et l'art de faire la soie en France (with figures); 4to, Paris, 1603.

** Instructions for the increasing of Mulberry Trees and the breeding of Silkworms, and the making of Silk in this Kingdom; in 4to, London, 1609.

†† De Formica liber unus, 8vo, Ambergæ, 1615.

‡‡ Variorum Observationum libri iv. in 8vo, Romæ, 1581, and other editions.

§§ Laus Publicis in vino se suffocaturi versiculis anacreontis inclusa; in 12mo, Schleus, 1631.

* Diversas Insectorum volatilium Icones, ad vivum accuratissime depictae; in 4to, Francofurti ad Mænum.

and *vice versa*! This certainly seems a strange idea for such an entomologist as Muffet to have taken into his head; but although Swammerdam, in his great work in 1669, took the trouble to disprove the statement at some length, Muffet's theory has been copied by compilers of works on Natural History from one to another, without scruple, for over 200 years, and I dare say many readers will remember having met with it in some of the so-called popular books on Natural History even at the present day—Muffet's name alone having been taken as a sufficient guarantee of the truth of such an assertion.

On first reading the above statement in Muffet's work, my admiration for his knowledge of his subject received a severe shock. I was much interested with a recent communication to the "Entomologist," in which was recorded an instance where the head of the imago did really appear at the tail of the pupa! A similar freak of nature must have been observed by Muffet, who evidently did not however recognize in it "the exception which proves the rule;" thus his apparent inaccuracy has suddenly been satisfactorily explained.

I have above endeavoured to trace the rise and progress of Entomological Literature from unknown writers before the time of Aristotle (who was born nearly 400 years before the Christian era) down to the publication of Muffet's "Theatrum Insectorum," A.D. 1634; and therefore, although insects were by no means unnoticed before, Muffet's book, which was printed at London, was the first separate work on all orders of insects published to the world, and England can thus lay claim to having produced the earliest really important work on Entomology, the book in question.

WILLOUGHBY GARDNER.

N.B.—The writer will be glad to receive any additions or corrections to the above necessarily somewhat imperfect notes.

OLD ENGLISH PLANT-NAMES.—No. II.

LIST of old English plant-names, taken from Lee's "Introduction to Botany," and Berkenhout's "Synopsis of Natural History," concluded:—

Old English Names.	Modern Synonyms.
Virgin's-bower.	Clematis.
Dog's-rue.	Figwort.
Double - tongue or horse-tongue.	Butcher's-broom.
Dragons.	*Arum maculatum.*
Starry duck's-meat.	Callitriche.
Dwale.	Nightshade (Belladonna).
Ebony of the Alps.	Laburnum.
Edders.	*Arum maculatum.*
Flybane.	Catchfly (*Silene anglica*).
Sicklewort.	Mountain bugle (*Ajuga pyramidalis*).
Fryer's-cowl.	*Arum maculatum.*
Gill.	Blue-bugle.
Stinking gladiole.	Iris.
Golden cup.	Buttercup.
Go-to-bed-at-noon.	Goatsbeard.
Hairbell.	Blue hyacinth.
Burgundian hay or hedgehog.	Prickly medick.
Hep tree.	Wild rose.
Herb-bane.	Broomrape.
Herb-trinity.	Violet.
Herb-twopence.	Loosestrife.
High-taper.	Great mullein.
Hindberry.	Blackberry.
Grass-honeysuckle.	Scented trefoil.
Blessed herb.	Common avens.
Horns.	Medick.
Immortal eagle-flower.	Touch-me-not.
Jupiter's beard.	Ladies' fingers.
Jupiter's distaff.	Wild sage.
Kermes.	Oak.
King's-spear.	Asphodel.
Pestilent-wort.	Coltsfoot.
False phyllyrea.	Buckthorn.
Pick-tooth.	Wild carrot.
Piperidge-bush.	Barberry.
Piquets.	Wild pink.
Rocambole.	Garlic.
Shepherd's-rod.	Wild teasel.
Setterwort.	Hellebore.
Shave grass.	Horse-tail.
Snail-clover.	Medick.
Bastard French spikenard.	Common matgrass.
Celtic spikenard.	Valerian.
Stavesacre.	Delphinium.
Red maithes.	Pheasant's-eye.
Locker gowlans, B.	Globe-flower.
Park-leaves, B.	Tutsan or great St. John's wort.
St. Peter's wort, B.	*Hypericum quadrangulum.*
Male-handed orchis, B.	*Orchis latifolia.*
Female - handed orchis, B.	*Orchis maculata.*
Frog satyrion, B.	Frog orchis.

GEO. ROBERTS.

Lofthouse.

MR. J. T. CAMPBELL, in the "American Naturalist," expresses his opinion, that the crow is one of the most industrious of forest planters and seed-transporting agents.

SCIENCE DIRECTORY.

GREENOCK *Natural History Society*. Rooms, Watt Institution, Kelly Street, Greenock. President, Dr. W. J. Marshall; Hon. Sec., Dr. Marens Calder, 13 Newton Street. Lectures and exhibitions during winter and excursions in the summer.

Haslingdon Natural History Society. President, J. J. Rushton; Hon. Sec., J. Rawcliffe.

Louth Naturalists' Society. President, Mr. T. E. Markham; Vice-President, Mr. A. R. Yeoman, M.A.; Hon. Sec. and Treas., Mr. H. Wallis Kew, F.E.S.

SCIENCE-GOSSIP.

A MOVEMENT has been started in Manchester to purchase an annuity for Mr J. B. Dancer, the well-known photographic inventor. Mr. Abel Heywood is honorary secretary.

THE Organising Committee of the British Association has arranged that a special discussion shall be held on "The Physical and Physiological Theories of Colour-Vision" at the Birmingham meeting in the first week of September. The discussion will be opened by Lord Rayleigh; Dr. Michael Foster and others will take part in it.

THE friends of the late Dr. Flight, F.R.S., are getting up a fund [for his widow and young children. Mr. L. Fletcher, Natural History Museum, Cromwell Road, S.W., is the hon. treasurer.

MESSRS. GEORGE BELL & SONS, 4 York Street, Covent Garden, have just published part 1 of the "London Catalogue of British Plants," eighth edition, price 6*d*.

THE discovery of the so-called allotropic condition of nitrogen is now denied.

CELLULOSE has been found in another animal, a Protozoan Ophrydian. The only animals in which this vegetable substance had previously been found were the Ascidians.

A WRITER in the "American Naturalist" gives an account of a swallow which set the broken leg of one of its nestlings, and afterwards carefully bandaged it with horse-hair.

MR. J. JENNER MUIR has examined the hairy people exhibiting at the Egyptian Hall, and terms them cases of hypertrichosis. The man is covered all over with hair several inches long.

THE Geologists' Asociation had a whole day's excursion to the Maidstone district on July 10, in conjunction with the Maidstone and Mid-Kent Natural History Society. The long excursion of the Association will this year be to Northumberland, and last from August 2 to August 7.

IN the city of Kimberley, South Africa (which is lighted by electricity), the electric current is utilised to kill the abundant stray dogs.

THE Life of Darwin (with a short autobiography) is announced as nearly ready for publication.

MICROSCOPY.

A METHOD OF USING BISMARCK BROWN.—Carbolic acid, 15 minims; distilled water, ½ a fluid oz.: dissolve. Add saturated alcoholic solution of Bismarck brown ¾ of a fluid dram; filter, and keep in a corked or stoppered phial. The carbolic acid must be the strongest crystallised, and must be diluted in the usual proportion of one part distilled water to twenty parts of the crystallised acid. This method is an adaptation of a solution of fuchsin recommended by Gradle ("Amer. Monthly Micro. Journal," vol. v. p. 76), Bismarck brown taking the place of fuchsin, of which latter dye Gradle employs only ½ a fluid dram. I find my stain well adapted for bacilli, and it gives excellent results with cells both animal and vegetable. The epithelial cells from the mouth stain in three or four minutes, the nucleus being well brought out. The nuclei in cells from the common plantain (*musa*) take a distinct red stain, the cell-wall being brownish-red; sections of leaves and stems also take a red stain for the nucleus; the chlorophyll granules at first retain their green colour, producing a very nice effect with the ¼ or ⅛ objective. If any readers of SCIENCE-GOSSIP give my stain a trial, I shall be glad to learn their opinions on it in subsequent numbers.—*W. J. Simmons, Calcutta.*

THE "JOURNAL OF MICROSCOPY" (edited by Mr. A. Allen).—This welcome periodical is as vigorous as ever. The July number contains original papers on "Anagallis arvensis," by R. H. Moore; "The Power of Movement in Plants," by H. W. S. Worsley-Benison; "Grosse's Classification of the Bird-Lice," or Mallophaga, by Prof. Macloskie; "On Making Useful Collections of Insects," "The Microscope, and how to Use it," extracts from the Postal Society's note-books, and a host of memoranda.

ZOOLOGY.

ABNORMAL FORM OF PLANORBIS VORTEX.—Distorted forms of this species are sometimes met with in which the whorls are more or less drawn out and separated from each other, the shell assuming a spiral shape, the diameter being increased as each whorl is added; thus, if it were possible to squeeze the whorls flat, they would fit into each other, and the shell assume something of its usual shape. I took a

very peculiar distortion last December, differing from this, the spiræ being very much produced, the whorls united and the shell varying but very little in diameter from apex to base, the outline being in fact very like that of *Bulimus decollatus*. I should be glad to hear if any one has met with a similar form. —*F. W. Wotton, Cardiff.*

THE MOLLUSCA OF CLONMEL, IRELAND.—The Rev. A. H. Delap has sent me a large selection of the slugs and shells of this district; and as there is no existing list of the mollusca of Tipperary or North Waterford, and because the collection contains many interesting forms, I have drawn up a list of them for the use of your readers, which is as follows: *Arion ater* vars. *rufa* and *nigrescens*, and a small example of var. *bicolor*. *A. subfuscus*, Drap., new to Ireland: the specimens are bright orange, with ill-marked lateral bands (var. *aurantiaca*); the jaw of this species has twelve or more well-marked ribs. *A. hortensis*, var. with orange slime, var. *pyrenaica*, Moq., and a variety (? species) larger than type, grey, with narrow lateral bands. *Arion distinctus*, Mabille? var. *subdeleta*, tentacles blue-black, head of the same colour, body and mantle greenish or yellowish-grey, with very indistinct brownish lateral bands, tail darker than the rest of the body, foot pale; length about 20 mill.; shell oval, flattish; jaw dark brown, crescentic, almost simple, liver dark. Of this several were sent, all similar: it appears to be a good species, but does not agree in all particulars with *A. distinctus*. *Amalia marginata*, a small and dark one; *Limax agrestis* var. *sylvatica*; *L. maximus* var. *fasciata*, Moq.; *L. arborum* var. *maculata*, very abundant in one locality in Waterford, *L. arborum* var. *decipiens*, ground-colour brownish-grey, but markings coalesced, producing the appearance of pale spots on a dark grey ground, lateral bands ill-marked on mantle, and none on body; keel short, dorsal line partly obsolete. This slug is very like some forms of *L. variegatus*, Drap. *Succinea Pfeifferi* var. *brevispirata*, Baudon (new to Ireland), and two other varieties, one (*virescens*) greenish, with an elongated spire and deep suture, and the other (*rufescens*) reddish, with a shallow suture. *Vitrina pellucida*, *Hyalina cellaria* and var. *albinos*, *H. alliaria*, Jeff., *H. crystallina*, *H. excavata*, *H. pura* type, *H. radiatula*, *H. nitidula*, and vars. *nitens* and *Helmii*, *Conulus fulvus*, *Helix lamellata*, *H. nemoralis*, vars. *libellula* 00300, 12345, *rubella* 00300, 12345, and 1(23)45, and *castanea* 00000. The pale-lipped var. *roseolabiata* also occurs, but *H. hortensis* has not occurred in the district, although a careful search was made for it. *H. caperata*, *H. virgata*, and var. *albicans* and var. aff. to *lutescens*, *H. rufescens*, *H. concinna*, *H. ericetorum*, and var. aff. to *deleta*, *H. rotundata* and var. *alba*, *H. pulchella*, *H. rupestris*, *Cochlicella acuta* and var. *bizona* (the occurrence of this species so far from the sea is very remarkable); *Cochlicopa lubrica*, and varieties approaching *viridula* and *ovata*, *Pupa umbilicata* and var. *alba*, *P. marginata*, *Clausilia rugosa* and vars. *parvula*, Turton, and *tumidula*, Jeff., *Bythinia tentaculata*, and red-brown var. (*rufescens*), *Valvata piscinalis*, *Planorbis marginatus*, *P. contortus* var. *excavata*, much depressed and sunken above; *P. spirorbis* var. *ecarinata*, *Physa fontinalis*, *Limnæa peregra* and vars. *ovata*, *intermedia*, and *solemia* (more ventricose, whorls more convex, new to Britain); *L. palustris*, *L. truncatula* var. *elegans*, Jeff. (several sent: this is a remarkable variety, almost a subspecies); *Ancylus fluviatilis*, *Sphærium corneum*, and *Pisidium pusillum*.—*T. D. A. Cockerell, Bedford Park, Chiswick.*

PRESERVING BEETLES.—At a recent meeting of the Entomological Society of London, Dr. Sharp exhibited a number of species of Staphylinidæ, prepared by him some years ago with a view to their special protection and permanent preservation. The insects were placed in cells of cardboard, and these were covered above, or above and below, with cardboard, the whole being hermetically sealed by applications of successive layers of bleached shellac. The President said the plan appeared to be very successful where the cardboard cells were left open on both sides, but when the cell was complete below only one surface of the insect could be examined.

THE DEVELOPMENT OF THE TADPOLE.—In reference to this subject, has it been noticed that the tadpole is ciliated all over at an early age? Last year already I noticed a ciliary movement in the egg, and when the young were hatched I saw distinctly that the whole animal was covered with very minute vibratile cilia, an observation which was repeated this year. The cilia are in rapid motion, and produce a strong current in the water, flowing from the head backwards, and so no doubt help powerfully the function of respiration through the skin. When the tadpole is about half grown the cilia are suddenly lost; within a few days I could only find a few tufts here and there, and in another day no trace of them was left. The cilia are very minute, about the size of those covering the "body" of a stentor, and very difficult to see when in rapid motion; it requires a very good background illumination, and a two-thirds or one-half inch objective.—*Charles Rousselet.*

CLATHRULINA ELEGANS IN ENGLAND.—Please refer your correspondent Mr. T. W. Moss to my "Portfolio" (No. 11, August 1885), which contains a sketch of *Clathrulina elegans* which I found in this neighbourhood in 1884; and there is a report in the "Midland Naturalist" of April 1884 of my exhibit of it at the local society's meeting. In the June 1885 number of the "Transactions of the Essex Field Club," at p. 50, Mr. Charles Thomas records its occurrence in Essex in 1882. Another of my correspondents has also found it in Sussex.—*Thos. Bolton.*

BOTANY.

Deformity of Fruit of the Sloe.—When staying at Killarney last June I saw a bush of *Prunus communis*, the sloe, covered with legume-like green excrescences, like the pods of a pea or bean; the bush had no fruit (drupes). Balfour in his "Class-book of Botany" gives a similar instance, as observed near the banks of the Dee near Aberdeen by Sir Wyville Thomson. Would any of your readers kindly inform me by what insect is this peculiar abnormity of the fruit produced?—*C. Donovan, jun., B.A., F.E.S.*

The London Catalogue.—Recently I have been informed by a botanical friend that the authority of the London Catalogue of Phanerogams, etc., is being impeached, and that its nomenclature is not to be relied upon. This to me is a very serious proposition. For nearly two years I have been preparing a herbarium for the Bedfordshire Natural History Society, and collating records for the publication of the county flora. Some years ago the Botanical Committee, of which I am secretary, passed a resolution to adopt the nomenclature of the London Catalogue, and as, independently of that, I was always assured that the authority of the London Catalogue was unquestionably good for such purposes, I have based all my work upon it. In addition to accepting the names of the London Catalogue, the census has been referred to in compiling the plant-list, and provision has been made in the printed specimen label for the London Catalogue numbers. If some other system is to be adopted, most of my labour will go for nought. Still I am willing to listen to reason, and perhaps it would be to the interest of the readers of Science-Gossip if a discussion on the subject were started in these columns. As I am naturally somewhat predisposed in favour of the London Catalogue, I will open the case in its behalf. For many years botanists have been acquiescing in the nomenclature of the London Catalogue. Many local floras have been based upon it, and the numbers have been adopted for the purpose of exchange. If that system is not to be accepted, what is? And who shall determine that whatever supersedes the London Catalogue shall be final? We must adhere to something, and the London Catalogue seems good enough for all practical purposes. My friend (the above-mentioned) had distinguished *Ran. eu-heterophyllus*, of Hooker's Flora, and could not connect it with any species or variety in the London Catalogue, although I suggested it might be No. 15. However that may be—even supposing that to be an example of a plant not clearly distinguished in the London Catalogue—I should not consider a case was made out against that publication; because, while there is such indefiniteness about the water crowfoots, and opinions are so various, the London Catalogue is as likely to be right as anybody else, and if it is wrong it can be revised. Again I ask, What system are we to adopt? The latest edition of Hooker's "Student's British Flora" shows the most extraordinary vagaries in the nomenclature, and I am quite persuaded that these variations must seriously detract from the value of the work. Really, when I look at the book, I can hardly believe it is the "British Flora" that it purports to describe! Whenever it was possible it would seem that some obsolete name has been raked up; much has been done to aggravate the difficulties of the student in whose interest the work is supposed to be published, and it is not easy to determine whether it differs less widely from its previous editions than it does from every other list extant. I certainly would never consent to throw over the London Catalogue in favour of such a system; not because there may not be a good defence for the names adopted, such as priority or suitability, but because in such matters we must adhere to custom. If not, who or what shall be the dictator? If the further question should arise as to who should say what is the custom, I would suggest that the editor take a poll of his botanical readers. Let the latter send to the editor the name of the system they adopt; the majority will then decide what is the prevailing custom.—*John Hamson.*

Abnormal Woundwort.—I wish to record a variation which I discovered in a specimen of *Stachys sylvatica*, Linn. All the flowers are sessile except those of one whorl, which are supported on two pedicels, one in the axil of each bract. One pedicel supports six flowers, the other three. The central flower of the three is most remarkably abnormal, the corolla being six-lobed—lobes equal, undivided, except that the lower or anterior lobe is slightly notched at the extremity; the stamens number six, and are alternate to the lobes of the corolla, smaller than usual, though the flower is of the usual size. The corolla is coloured as usual, the anterior part being variegated with white. The calyx has the usual number of teeth, and the ovary, style and stigma are normal. The bract in whose axil this abnormal blossom occurs is very large, measuring five inches in length, exclusive of the petiole.—*A. W. Harrison, Thornton Heath.*

Seasonal Variation of Plants.—Are there many of our native plants that have two separate seasons for flowering? About a month ago, I found *Erigeron acris* with florets changing into down. It must have flowered early in May. There were six stems, three of which bore single terminal flowers, the other three showing no signs of flowering. All were of equal height—about four inches—except one, not quite two inches, including its flower. Transferring the whole to a flower-pot, I have since observed it with considerable interest. The downy seeds of the three flowers are now (July 6th) only waiting for a breath of wind to take them away.

Two of the remaining stems have grown to five and a-half inches, and are giving some indication of future flowering, while the third has shot up to eight inches, and exhibits four flower-buds, developing very slowly —the proper course, according to that lovely work on British Wild Flowers by Sowerby and Johnson (Van Voorst), whose dictum respecting it is: "flowers in racemes, August." But what then of the early single flowers? Turning to Withering, I find as follows: "Fruit-stalks supporting from one to three flowers; time of flowering, July to September, also early in spring." This meets the case exactly, with the exception of limiting the flowers to three, whereas the aforesaid wilful stem evidently intends to exhibit four.—*J. Wallis, Deal.*

The Grey Hair-grass (*Corynephorus canescens*).—On the 19th of last month, at Homersfield, which is twenty miles from the sea on the Suffolk side of the Waveney, I found several tufts of the grey hair-grass (*Corynephorus canescens*) growing in a gravelly situation. Bentham's "Handbook of the British Flora," fourth ed., says that in Britain this grass is "only known for certain on the sandy sea-coasts of Norfolk and Suffolk, and in the Channel Islands;" and Low's "British Grasses" calls it one of the rarest British grasses, found on the sandy coasts of Norfolk, Suffolk, Dorset, and Jersey. Under these circumstances it may be interesting to you and to your readers to know of this rare grass having been found so many miles inland.—*Walter Cordwell.*

GEOLOGY, &c.

Glacial Action near Grasmere.—In June last, during a holiday in the Lake District, I was struck by the great number and size of glacial moraines near the outlet of Easedale Tarn, left without doubt by the ice during the last glacial period in that wild upland valley. On the north side, just above the outflow from the tarn, the heaps are so many, and almost artificial in appearance (looking very like a quantity of soil and stones shot by "navvies" from a platform, only grass-grown) that they seem to indicate a long period of time, when the ice lingered slowly retreating or again advancing, in slightly different courses, before the glaciers finally left the rough rocks bounding the valley on three sides, and are well worthy of special study by any geologist staying at Grasmere.—*Horace Pearce, F.G.S., Stourbridge.*

"The Sponge-Remains of the South of England."—Dr. G. J. Hinde, of the British Museum, has forwarded us a copy of his paper from the "Philosophical Transactions of the Royal Society" on the sponge-remains in the lower and upper greensand of the south of England. To students of geology this is an invaluable memoir, and the six beautifully prepared quarto plates of sponge structure, etc., will greatly aid students in diagnosing the specimens, and in working them out with the microscope.

"British Petrography."—We have received part 6 of this important work, and are pleased to state that it fully maintains its high character, artistic as well as scientific. The coloured plates (accompanied by Key-plates) are devoted to Diabase, Olivine Diabase, and Dolerites. Mr. J. Harris Teall commences with the British Peridotites in the present part. Geological students have now a fine opportunity of obtaining a reliable monograph on the structure of our igneous rocks.

NOTES AND QUERIES.

Do Migratory Birds return to their old haunts?—Much evidence has been given by naturalists to prove that birds of passage return to their old haunts. The following, I think, may be of interest to some of the readers of your valuable paper. For the past two springs a cuckoo, gifted with a decidedly peculiar note, has visited this neighbourhood. Within the last fortnight it has again arrived. Its song consists of three clear distinct notes, "Cuck-coo-coo," the second note being a semitone above the last. This it never varies. We all know that towards the end of its sojourn the cuckoo suffers from hoarseness, or, as the country people say, "changes its tune." Although this bird suffers in a similar way, yet it still maintains its peculiar song—three notes. As far as I can ascertain it does not wander beyond the same limits—from the park here to a little hill about half-a-mile distant. I think these facts not only conclusively prove that the cuckoo returns to its old quarters year after year, but that it also restricts itself during its stay in this country to the same locality.—*F. C. Taylor, F.R.G.S., Summerleaze, East Harptree.*

Cats and Rabbits Crossing.—A reader of Science-Gossip has written to me from New York, of the name of A. Mathews; but, he not giving me his full address, I have to thank him through the columns of Science-Gossip for the information given regarding my query in the May number as to cats and rabbits crossing. The writer states that "in the little village of Caldnell on the shore of Lake George, in Natten co., New York, there was a few years ago a breed of cats that the inhabitants of that village called the 'rabbit cats.' They were grey and white cats, with short hind-legs and short tails. They hopped like a rabbit; in all other respects were like Maltese and white cats. I have seen two of these cats myself."—*Rev. S. A. Brenan, Glendun Lodge, Cushendun, co. Antrim.*

Fungus in Water.—Can any reader inform me what the name of the fungus is that grows in a mixture of calendula and water? One appeared in a closely corked bottle. It resembles somewhat the vinegar fungus, only it is white and wrinkled, like thin white kid or tissue paper. At one end there is a protuberance like a root. The liquid was mixed about two years ago. In the month of January last

small white particles were observed floating on the surface, which have united into this floating mass. Would it be worth preserving, and how is this to be done?—*Rev. S. Arthur Brenan, Glendun Lodge, Cushendun.*

Flight of Bees.—Since reading Mark Antony's reply (p. 143) to my note (p. 118) on the flight of bees, I have looked up my copy of Goldsmith's "Animated Nature," and I find my countryman has been misquoted by your correspondent. Goldsmith's words are: "Every bee when it leaves the hive to collect this precious store enters into the cup of the flower, particularly such as seem charged with the greatest quantity of this yellow farina." In this passage, Goldsmith is describing the pollen or fertilising grains, borne only on the stamens, which are always situated in the centre of the flower, and which the bees cannot get without entering the cup of the flower. Mark Antony asserts that "naturalists vary greatly," in proof of which he brings forward part of the above passage, in which the words "this precious store" are left out, "honey" being substituted for them. Any person may make a mistake, but this looks like a deliberate alteration. I would just say further that Mark Antony's original query (p. 94) was about the flight of bees to and from their hive, by which I understood the honey-bee (*Apis mellifica*), to be meant, and not any of the 221 species of wild British bees. I thought your correspondent was desirous of obtaining information. —*H. W. Lett, M.A.*

A Curious Fact.—A ewe, three years old, belonging to a farmer in this parish (Tuxford, Notts.) gave birth in the first week in March last to a male lamb, which she suckled up to the fifth of June, on which date she dropped another male lamb, the firstborn not being afterwards allowed by her to suck. I may mention that the period of gestation in the ewe is seventeen weeks. No mistake could arise, as, apart from all the sheep being individually known to the owner, there is the fact that only those having lambs were placed in the field in which the latter birth occurred. Last year this ewe had a single lamb. —*W. A. Gain, Tuxford, Newark.*

Spots on Sycamore-leaves.—I have no doubt the spots referred to by W. B. Drummond (p. 167) are due to a common fungus (*Capnodium Footii*, Berk.) which is very abundant in Sherwood Forest. Dr. Cooke, in his "Handbook of British Fungi," says: "It occurs on leaves of evergreens, deciduous trees, as the beech, and on herbaceous plants, as *Mercurialis perennis*." Of course one must needs see the spots to be able to speak with absolute certainty about them. The work of insects is sometimes so similar in its effect upon plants to the micro-fungi that even a careful collector may be deceived till he examines the specimen under a lens.—*Hilderic Friend, Worksop.*

Setting Foreign Lepidoptera.—In the "Scientific Enquirer" for July, Mr. G. H. Bryan gives the following recipe: For relaxing these I far prefer plaster of Paris to sand. The plaster should be stirred up with water to form a paste, poured into the bottom of a shallow biscuit-tin with a tight-fitting lid, and allowed to harden. To moisten the plaster, pour some water over it, and after a short time drain it off. A piece of perforated zinc may be laid on plaster, to prevent the insect from touching it. The butterflies are laid on this, and the box closed and put in a warm place. I relaxed 150 butterflies from Ceylon in this way. One of the large *Ornithoptera darsius* was ready in twelve hours, while others of this species required four days. Some Mentone butterflies, caught seven years previously, were ready to set after five days. When set, the insects must be left on the setting-board for at least a fortnight (three weeks is better), otherwise the wings will spring out of place. If this precaution is attended to, the insects will rarely spring at all; but, should any show a tendency to do so, the wings may be fixed in place with a very little thick gum (containing a drop or two of glycerine) placed at the base of the wings on the under side.

Aquarium Difficulties.—I have had several minnows in an aquarium for over twelve months, which have appeared all along to be quite healthy. A few weeks ago I placed a few medium-sized specimens of *Limnea stagnalis* in the same aquarium, and to my surprise I found this morning two of my minnows dead, and several of the snails attached to them and a large part of the abdomens eaten away. Is it possible they could have been destroyed by the snails, as they appeared to be in a perfectly healthy condition? and is it not unusual for Limneæ to eat other than vegetable matter? I may add there is a good supply of Chara in the aquarium.—*J. Collins.*

Corncrakes.—Many of the readers of Science-Gossip have doubtless noticed the great tameness of cornrails whilst sitting on their eggs, or even after the young birds are successfully hatched. I saw a curious instance of this yesterday; the poor bird had been disturbed by the mowing and clearing away of the hay, and took up her abode in the centre of the lawn, where she was discovered by one of the daughters of the house. She did not attempt to move, but sat quite still, allowing herself to be gently stroked, and looking quite happy whilst one of the eight tiny black chicks was being tenderly handled and examined. Just then two other ladies came up, in whom the mother did not seem to have as much confidence as her first friend, for she got up slowly, and took refuge behind a low shrub some little distance off, whilst the small fluffy black creatures scattered in all directions till the mother's voice was heard calling to them in such a soft sweet note, widely different to the usual harsh grating sound of the corncrake. A wonderfully pretty sight it was to watch those eight tiny fledglings being gathered safely home; some had wandered in their fright to a great distance, and it was evidently as much as the weary little legs could do to carry them back; they paused and rested, and it needed all the encouragement of their mother's voice to induce them to gain the safe shelter of her wings. At last all was still, and we left them in the softly falling shades of the peaceful Sunday evening, devoutly hoping that neither cat nor dog, nor village schoolboy might discover the retreat of our charming little pets.—*F. M. B. C.*

Notes from the Books of the "Fairford Juvenile Naturalists' Club."—(1) Small tit's nest in old tomb, Fairford churchyard. (2) Blackbird's nest in old bucket. These birds brought up their young in this queer situation. (3) Blackbird's nest in middle of unused pathway on the ground. (4) Black tern shot. It was flying over the river Coln, Fairford Park. (5) Beetle (Sylpha), being caught and placed in the collecting box, devoured a Necrophorus—or at least its body disappeared, leaving only the elytra and legs. Was not this rather unusual? (6) Three specimens of *Viola odorata*, with three spurs each. (7) Stickleback

fiercely attacked a couple of newts, and drove them away from a certain place in a small pond. We searched for the brave little fellow's nest, but could not find it. We should be glad to know if any one else has observed the like.

BUTTERCUP MONSTROSITY.—Recently I saw a very curious freak of nature in a buttercup (*Ranunculus bulbosus*). A double flower had grown on a stalk formed by the cohesion of five or six ordinary flower stalks, so that the flower seemed to grow from the top of a vegetable ribbon of about an inch wide. —*John J. Carne.*

YEW POISONING.—The thanks of all your readers are, I am sure, due to Mr. Modlen for his clear and admirable paper on "The Poisonous Properties of the Yew." The facts cannot be too widely known. Perhaps you will allow me to give my experience as to the effect of yew poisoning on poultry. Last winter a large limb of a yew in the churchyard here was broken off by the weight of the snow. The limb was cut up on the spot, and placed, foliage and all, in the poultry-yard. The fowls immediately began to peck it. Its first effect was to "scour" them considerably—the foliage passing through the alimentary canal without much alteration in colour. They began to mope and lose their feathers, and present altogether a most melancholy appearance; but none of them died. Of course the yew was removed when it was found the fowls were eating it, but they probably had access to it for some days. I do not think the poison interfered with their laying, or with the wholesomeness of the eggs. With regard to the berries, I often used to eat them when a child, but I never crumbled or swallowed the stones, as I was always told that they were poisonous, though the pulp was harmless. There is a female yew on the lawn here which is visited every autumn by hawfinches, which eat the berries, and crack the stones, I suppose for the sake of the kernels. This, and what Mr. Lett tells us in your last issue of mice eating the berries of *Solanum dulcamara*, reminds me of another fact which bears out the truth of the familiar adage, "One man's meat is another man's poison." The late Mr. Darwin once showed me some beans of strychnos which had been eaten through and through, apparently by the larva of some fly or moth. They had been sent him (he said) by a correspondent to show that some living thing could be nourished on what is to most animals a deadly poison. By-the-bye, may I ask Mr. Lett whether the poisonous property of the berries of *Solanum dulcamara* is really proved? I see C. A. Johns only speaks of them as "narcotic." —*R. S. Pattrick, Sellinge Vicarage, Kent.*

OLD ENGLISH PLANT-NAMES.—It seems strange that "cheese-rennet" should be the old English plant-name for crosswort. I cannot discover that this plant (*Galium cruciatum*) has ever been used in the way which the ancient name indicates. "The generic name is derived from γαλα, milk, one of the species having been employed to curdle milk" (see Barton and Castle's "Flora Medica," 1877). The species referred to is evidently yellow bed-straw (*G. verum*). Sowerby, after describing the yellow bed-straw, adds: "The power of this herb to coagulate milk is well known, and Gerarde tells us the best Cheshire cheese in his time was made with it." It is easy to understand that "cheese-rennet" should be the old English name of a plant possessing the properties of the yellow bed-straw, but I fail to see the reason for calling crosswort by such a name. Perhaps Mr. Roberts will favour us with some further information as to this.—*A. G. Wheatcroft.*

BELLIS PERENNIS.—I yesterday walked over the bare and thinly-turfed ridge of the chalk downs for some miles, beneath a tropical temperature, in the direction of Dorking. As far as I proceeded, I saw nothing but diminutive daisies, with blossoms not exceeding the third or fourth of an inch. I noticed on the occasion of one of my previous walks that the dandelions were all dwarfed, and presented an equally remarkable appearance; but I afterwards learnt that they were in the habit of putting forth larger leaves and blossoms later on in the year; and this, I conclude, may also be the case with the daisies and other plants growing upon the scanty soil and among the thickly-crowded vegetation that covers the ridge of the downs, where the struggle for existence is very perceptible.—*A. H. Swinton, Guildford, July 8th.*

DELHI ELASTIC STONE.—Can any of your readers inform me what is the history and nature of the so-called "Delhi elastic stone," of which specimens reach the country from time to time as curiosities? The only one which I have seen—brought from Delhi by an officer—measures about nine and a-half inches by two and a-half in width, and half an inch in thickness; it has the outward appearance of a piece of coarse sandstone, of a cream or pale fawn colour, and the angles are all rounded off, though the surface shows no marks of friction. It will bend to a very appreciable extent in any direction, and under careful extension will yield in the direction of its length slightly. Its symmetrical appearance and rounded angles, with the absence of tool-marks, negative the idea of its having been fashioned out of a block, while its flexibility (for it is flexible rather than elastic) suggests a composite character — some organic matter, covered or incorporated with the inorganic; but I am assured that the fracture is homogeneous in appearance.—*C. E. Paterson.*

FROGS AND THEIR ENEMIES.—Your correspondent, Mr. W. M. Williams, says: "Few animals have more enemies than the frog." True; I once had a cat which was very fond of biting off and devouring the hind-legs of frogs. One day I caught her in the fact, and the screams of poor froggy were heartrending to hear; and yet in spite of this you will constantly hear persons say "frogs have no feelings." I saw several frogs minus their hind-legs before the above occurred, and could not for the life of me discover the cause. The wounds had healed most perfectly, but of course all leaping power of the frog was destroyed.—*Mark Antony.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

A. E. HALL.—The "Butterfly" only commenced this year, in monthly numbers, twopence each. The editor is Mr. Skuse, 9 Wellington Road, Bow Road, London.

AQUARIA DESIDERATA.—If any of your readers may be disposed to cultivate in an aquarium *Vallisneria spiralis*, I, having some to spare, will forward with pleasure plant on receipt of address and stamp.—B. M. Watkins, Treddow, Hentland, Ross, Herefordshire.

A. B.—Apply to Mr. Alfred Allen, 1 Cambridge Place, Bath, for all information respecting the Postal Microscopical Society. Mr. Allen is now Secretary, and also Editor of the "Scientific Enquirer."

S. SMITH.—The plants are as follows: 1, Lousewort (*Pedicularis sylvatica*); 2, wood sanicle (*Sanicula Europæa*); 3, guelder rose (*Viburnum opulus*); and, 4, butterfly orchis (*Habenaria bifolia*).

S. A. B.—The bumble-bees you sent up appear to have been partly devoured by field-mice.

A CORRESPONDENT very wisely suggests that we should get writers to give their various methods of mounting and preparing their various specimens, such as animal parasites, etc. Will our friends take the hint?

V. A. L.—The addresses are as follows: "Journal of the New York Microscopical Society," 12 College Place, New York; "The American Naturalist," Messrs. Macalla and Stavely, 9 Dock Street, Philadelphia.

T. G. B.—The best means of getting rid of the Aphides in your conservatory, would be by using Hughes' Aphicide. It is sold in 1*s*. 6*d*. bottles with directions, and can be easily applied by means of the spray to the under surfaces of the leaves, etc.

EXCHANGES.

WANTED, sets of eggs: long-tailed tit, white wagtail, land-rail, sandpipers, curlews, snipes, etc., for sets of stonechat, Ray's wagtail, ring-ouzel, twite, lesser redpole, goldfinch, etc.—James Ellison, Steeton, Leeds.

A CAREFULLY selected series of micro fungi on leaves *in situ*, accurately named and localised. What offers in slides, shells, plants, coins or otherwise?—Rev. Hilderic Friend, F.L.S., Worksop.

TEESDALIA and other British plants in exchange for other natural history objects.—Hilderic Friend, Worksop.

BRITISH mollusca, nearly 400 species and varieties, well represented.—F. G. S., 2 The Polygon, Clifton, Bristol.

WANTED, "Quart. Journ. Geol. Soc.," Nos. 1–30, 47, 51, 55, 56, 62, 74–76, 87, 129, or any of these, in exchange for geological works, fossils, or British shells. "Midland Naturalist," complete set for disposal.—F. G. S., 2, The Polygon, Clifton, Bristol.

FOR exchange, a few good examples of *Clausilia biplicata* from Putney, and of *Pupa secale* from Leckhampton. Wanted, *Helix pisana*, *Zonites Draparnaldi*, *Testacella Maugei*, with their respective localities; also Balea, Azeca, other Pupæ, Vertigoes, or offers.—Wilfred Mark Webb, 31 Aynhoe Road, Brook Green, W.

WANTED, a swarm of Carniolan bees. Will give in exchange twenty-three first numbers of Cassell's "Dore's Dante" and cuttings of good double and single geraniums and fuchsias, and some greenhouse ferns.—Miss E. Smith, Piperstown, Drogheda, Ireland.

WANTED, the "London Catalogue" of British mosses, second edition.—James Sinns, 3 Fairfield Street, Bolton.

AMERICAN moths, butterflies, and insects; imagoes of Lunar, Imperialis, Cecropia, Promethia, and Polyphemus, eggs, larvæ and cocoons in season, rare and characteristic fossils of the two American Silurians, for European moths, butterflies, insects, and cocoons and chrysalides of all kinds, and good microscopical mounts, etc.—H. A. Furniss, 56 Orange Street, Indianapolis, Ind., U.S.A.

BRITISH land and freshwater shells, including *Pal. contecta*, *V. pellucida*, *Z. crystallinus*, *H. pomatia*, *H. arbustorum* var. *flavescens*, *H. cantiana* var. *rubescens*, *H. pulchella*, *H. lapicida*, *Car. minimum*, *Cy. elegans*, etc. Desiderata: *Pal. vivipara*, *Plan. nitidus*, *H. revelata*, *H. sericea*, *H. lamellata*, and foreign Gasteropoda, especially Bulimi.—G. T. Rope, Blaxhall, Wickham Market, Suffolk.

OFFERED, fifteen odd parts of "Geologist" (fine plates), good natural history and other books, foreign stamps (many rare), birds' eggs, including siskin, brambling, cirl bunting, etc., for well-set named specimens of Lepidoptera and Coleoptera or store boxes.—T. Mackie, 66 Barking Road, Canning Town, E.

WANTED, a good microscope, with not many accessories; state full particulars.—H., 8 Tothill Street, S.W.

SIDE-BLOWN eggs of willow wren, gold crest, sedge warbler, meadow pipit, skylark, wheatear, Piet and Ray's wagtail, magpie, rooks, hooded crow, ringdove, partridge, red grouse, lapwing, curlew, oyster catcher, coot, mallard, teal, and eider ducks, artic tern, black-headed gull, grebe, cormorants, black guillemot. Wanted, duplicates in exchange.—A. Kelly, 5 Canal Lane, Aberdeen.

FOSSILS from chalk, Thanet sands, Woolwich beds, etc., in exchange for English silver or copper coins, medals, and tokens, or rare foreign stamps.—F. Stanley, Margate.

Two dozen mahogany slips for mounting opaque microscopical objects. Wanted, lumps of chalk containing Foraminifera, or anything useful to a microscopist.—Fred Beddow, Derby.

DUPLICATE slides of Foraminifera, diatoms, starches, hairs, etc., to exchange for named single species of Foraminifera, or will give two slides for one insect mounted without pressure.—Edward Halkyard, The Firs, Knutsford, Cheshire.

FIGUIER'S "Reptiles and Birds" to exchange for Lubbock's "Ants and Bees," or book containing illustrations of the Diptera.—Edward Halkyard, The Firs, Knutsford, Cheshire.

"ENTOMOLOGIST" for 1882–1885, "Entomologist's Monthly Magazine" for 1883 (unbound), Lubbock's "Ants, Bees, and Wasps," Cox's "Handbook of Coleoptera" (2 vols.), and Taylor's "Aquarium," all quite new, in exchange for "Carpenter on the Microscope," Huxley's "Lay Sermons," Darwin's "Descent of Man," other books, micro slides, or Coleoptera.—A. E. J. Carter, Argyle Crescent, Portobello, N.B.

WANTED, loan of Micro-slides for Photographic purposes. Slides given in exchange.—A. B., 115 Camden Road, Tunbridge Wells.

WANTED, choice specimens of land and freshwater shells in exchange for marine species.—Chas. Jefferys, Tenby.

WANTED, all kinds of insects, especially the following. Water beetles, cockchafers, wasp beetles, cardinal beetles, dor beetles, glow-worms, grasshoppers, saw flies, ichneumon flies and sheep-ticks, good slides of whole insects or others, in exchange.—W. S. Anderson, Ilkeston.

FOR piece of skin of Spotted Dog-fish cleaned and dried, ready for mounting, send stamped addressed envelope to H. E. Hurrell, 1 Church Plain, Great Yarmouth.

WHAT offers for "SCIENCE-GOSSIP" 1878 to 1885; two volumes "Encyclopædia Britannica," new ed.; "How to Work with the Microscope," Beale, new ed.; "Natural Law in the Spiritual World," Pollen, M. P. Edgeworth; "Chemical History of the Six Days of Creation," "British Sea-weeds," Landsborough; and many other standard works, send for list to F. C. King, 2 Clarendon Street, Preston, Lancs.

WANTED, in exchange for beautiful Red Crag fossils, eggs of the following: Golden-eye, great northern diver, black-throated diver, little auk, green cormorant, gannet, Sandwich tern, whiskered tern, gull-billed tern, Fulmar petrel, great shearwater, Manx shearwater, great black-backed gull, rock pipit, mountain finch, lesser redpole, mountain linnet, chough, raven, rook, common swift, wood-grouse, little ringed plover.—E. H. B., care of Editor of SCIENCE-GOSSIP.

BOOKS, ETC., RECEIVED.

"Smithsonian Report," 1884 (Washington).—"Eleventh Annual Report, U. S. Geological Survey," (Washington).—"Malt and Malting," by H. Stopes (London: F. W. Lyon).—"Horticultural Buildings," by F. A. Fawkes (London: Sonnenschein & Co.).—"Little Asker," by J. J. Wright (London: Swan Sonnenschein).—"British Fungi, Lichens, etc.," by E. M. Holmes and Peter Gray (London: Swan Sonnenschein & Co.).—"British Petrography," by J. J. Harris Teall, part 6 (Birmingham, Messrs. Watson Bros.).—"On Beds of Sponge-Remains in the Lower and Upper Greensand of the South of England," by G. J. Hinde, Ph.D.—"History of Fossil Crocodiles,"—"Literature and Nomenclature of British Fossil Crocodilia," and "The Genus Notidanus," all by Mr. A. Woodward Smith.—"Proceedings of American Academy."—"Report of Rugby School Nat. Hist. Soc."—"The Amateur Photographer."—"The Camera."—"The Scientific Enquirer" (June).—"The Hoosier Naturalist."—"The Garner" (June).—"The Naturalist."—"The Botanical Gazette."—"Ben Brierley's Journal."—"Journal of the New York Microscopical Society."—"Science."—"Journal of Conchology."—"Journal of Trenton Nat. Hist. Soc."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

COMMUNICATIONS RECEIVED UP TO THE 12TH ULT. FROM: C. T. M.—T. I. D.—R. S. P.—I. H. A.—M. R.—S. A. B.—G. E. G.—H. G.—T. W.—A. H. jun.—J. H.—A. E. J. C.—Dr. C. C. A.—J. J. R.—J. R.—A. E. H.—W. O.—J. T. R.—E. H.—W. A. G.—F. B.—W. J. V. V.—J. C.—T. M.—H. B. P.—T. D. A. C.—G. H.—J. M.—W. J. S.—A. K.—V. A. L.—F. M. B. C.—E. W.—F. S.—W. M. W.—E. S.—J. S.—H. M.—S. S.—W. G. W.—J. C.—S. L. M.—W. W.—W. W. W.—R. S. P.—W. C.—J. J. C.—G. R.—J. C.—H. P.—A. W. H.—J. E.—J. T.—B. M. W.—H. F.—J. A. jun.—C. T. H.—H. M. A.—W. S. A.—F. C. K.—H. W. K.—H. E. H.—T. B.—M. A.—A. B.—G. R.—C. J.—J. W.—A. G.—C. E. P.—H. W. K. &c. &c. &c.

THE RECENT VOLCANIC ERUPTION IN NEW ZEALAND.

PROFESSOR A. GEIKIE, F.R.S., has published the following account of this remarkable occurrence in "Nature." Until the report of a trained geologist has been received we must be content with the narratives, often conflicting, of the surveyors and of the Press correspondents who hurried to the scene of the great catastrophe that has recently devastated the wonderland of New Zealand. In the meantime, however, it is possible from the various accounts to trace the leading features of the eruption, and to note their resemblance to those of other recorded volcanic outbursts. It is impossible not to be struck with the analogy between the phenomena exhibited last June in New Zealand and those that accompanied the great Vesuvian eruption in the first century of our era. In both instances a mountain which had never been known to be an active volcano suddenly exploded with terrific violence, filling the air with ashes and stones. At each locality there were the premonitory earthquakes, the thick black pall of volcanic cloud hanging over the mountain, the descent of dust, sand, and hot stones, the discharge of mud, with, so far as known, no outflow of lava, and the overwhelming of an inhabited district under a deep covering of loose volcanic debris.

In a region so subject to earthquake shocks as that which crosses the centre of the North Island of New Zealand in a north-east and south-west direction, it was natural that no special attention should have been given to any greater frequency or violence of the shocks before the date of this volcanic eruption. But no doubt facts bearing on this subject have been noted by local observers, and will in due course be published. From the newspaper accounts, indeed, there would appear to have been various precursory indications which, in the light of subsequent events, may not have been without importance. It is said, for instance, that the extinct volcano Ruapehu, the highest peak in the North Island, which, since the discovery of New Zealand, has never been known to manifest any activity, began to steam at the top some three weeks before the eruption. A fortnight previous to the catastrophe a wave three feet high suddenly arose on the Lake Tarawera, lying at the foot of the mountain of the same name, and in the very focus of the subsequent disturbance, and washed the boats out of the boat-houses. Doubtless there were other premonitory symptoms, besides earthquake activity, of the approaching event, though only a few days before their destruction, the famous White and Pink Terraces were visited by a party of tourists who observed no unusual vigour in the hot springs there, nor any indication whatever that these fairy-like deposits were so soon to be the theatre of violent volcanic energy.

About half an hour after midnight on the morning of June 10 the earthquake shocks that are familiar to the inhabitants of the Lake District assumed an altogether unusual vigour and frequency. At the settlement of Wairoa, which is about five miles from the warm lake and sinter terraces of Rotomahana, the ground shook violently for an hour or more, the more powerful shocks following each other at intervals of about ten minutes. The alarmed inhabitants, startled from sleep, ran out of their houses or clung to each other inside for mutual assistance and encouragement. At last, a few minutes after 2 A.M., a shock of exceptional severity was followed by a deafening roar, and suddenly what is described as a "pillar of fire" rose up from the crest of the mountain range some five or six miles eastward on the opposite side of Lake Tarawera. The top of Mount Tarawera (about 2000 feet high) had been blown into the air, leaving a huge chasm on the flank of the mountain. The glow of the white-hot lava in the interior

ruddied the sky for miles around. Thousands of blocks of glowing lava described as "fire-balls" were shot into the air. The canopy of dark ashes that soon gathered over the mountain and spread out for miles around became the theatre of a violent electrical storm. It seemed to be torn asunder with incessant flashes of lightning, and the continuous peals of thunder, mingling with the bellowing of the volcano, increased the terror of the night.

That an eruption should ever take place from the three huge truncated cones that frown over Lake Tarawera was not regarded by geologists as a future probability. They had been extinct even from the times of early Maori tradition. To their solitary and mysterious summits the natives had probably for centuries been accustomed to carry their dead. The bones of many successive generations lay bleaching on that high lonely plateau, which had thus come to possess a peculiar sanctity in the eyes of the Maoris, who would not willingly allow a white man to approach it. Not only were these great cones to all appearance extinct, but the volcanic action of the whole district was of that type of waning energy which geologists have called the "solfatara stage." New geysers might break out, rivalling or even surpassing those already active in the district, and the orifices of eruption might shift from place to place, involving considerable local disturbance in their transference; but no one anticipated that in this district a great explosion, like the most gigantic outburst of Vesuvius, was likely to occur.

The magnitude of the explosion may be inferred from several facts which appear in the newspaper reports. An observer at New Plymouth, on the west side of the island, 150 miles from the scene of the disaster, saw the column of ashes rising far into the air, and computed its height to be not less than 22,000 feet. The noise of the explosion is said to have been heard at Christchurch, a distance of some 300 miles. The ashes fell over a vast area of land and sea to the north and east of the vent of discharge. Vessels sailing even 130 miles away found the air thick with fine dust, which settled on their decks. Near the scene of the explosion the depth of accumulated ashes, still quite hot, was found by some adventurous explorers, seeking to succour the poor Maoris, to be not less than 20 feet. At a distance of 30 or 40 miles the deposit was still several inches thick, so stupendous must have been the amount of rock blown into powder by the great explosion of Tarawera.

The materials ejected from that mountain appear to have consisted mainly of loose fragments of lava, cinders, ashes, and fine dust, with vast quantities of steam, while not improbably hot water and mud issued from the flanks of the volcano. So far as can be gathered from the narratives, there was no emission of lava, though, from the "flames" and "fire-balls" so generally referred to, it may eventually be found that molten lava flowed out somewhere on the sides of the mountain.

Not far from the base of the volcanic cone of Tarawera lay the warm lake and sinter terraces of Rotomahana. The treacherous nature of that district has been often remarked—its steam-vent, boiling pools, hot steaming soil, and eruptive geysers, not always remaining in the same places, but apt with no warning to break out at fresh points. This weird locality has been involved in the volcanic disturbances of the region. The famous terraces have been blown into the air, and fragments of their sinter have been picked up among the dust and ashes of the surrounding country. The lake on the borders of which they stood has been ingulfed. On their site scores of mud-cones are vomiting forth stones and mud, and hurling clouds of steam into the air. New vents for the escape of steam and the outflow of volcanic mud have been opened all over the country, and the aspect of the landscape has been entirely changed. A scene of fairy-like beauty has been transformed into one of loathsome desolation. Even if the volcanic activity calms down and the sinter springs can recommence their work of deposition, many generations must pass away before they can build up again such terraces as have been destroyed. The new features of the country will no doubt prove attractive to tourists, but the marvellous staircases of Te Tarata are a dream of the past.

Among the features of the eruption, on which it is to be hoped that light will be thrown by the more detailed investigations of experts, are the source and behaviour of the mud that overwhelmed the settlement of Wairoa. From the narratives of the survivors, showing that the houses were crushed in from above, the mud seems to have descended through the air upon the district, mingled with ashes and stones. Rain fell during the night, but the mud could hardly have been formed in the air by the mixing of the rain and dry ashes. It appears to have come down as liquid mud, and was no doubt ejected as such from some neighbouring vent. The orifice of eruption could scarcely have been the great cone of Tarawera; more probably there were many vents, not only at Rotomahana, but nearer to Wairoa, by which a large amount of mud was discharged over the surrounding district.

Another question that will no doubt receive careful consideration relates to the movements of the air during the time of the eruption. Barometric observations at Rotorua, and at places on the opposite sides of the island, will be of much interest. From the newspaper accounts it is clear that a great atmospheric disturbance accompanied the eruption. About an hour after the great explosion, a gale suddenly arose in the Rotorua and Wairoa district, and blew with such fury as to uproot and prostrate immense numbers of trees, and to strip off leaves and branches from those that were left standing. At Rotorua

the direction of the hurricane was towards the scene of volcanic activity, as if the air were being drawn into the vortex caused by the explosion. A few hours later, the gale as suddenly ceased, and then ashes began to fall, borne northwards by some upper current of air. We have yet to learn how far these atmospheric movements were connected with or independent of the eruption.

There are some excellent geologists in New Zealand, who have now a rare opportunity of investigation. No mud-eruptions at all comparable in magnitude to those of this summer in New Zealand have ever been known. The connection of these with the explosions of Tarawera, the relation of the latter to the lava-reservoir inside, the nature of the so-called "flames" and "pillar of fire" so conspicuous on the night of the eruption, the sources of the "fire-balls," and many other details, offer a wide and most interesting field for the colonial observers. Geologists all over the world will await with much interest the publication of their investigations.

Since the above was written, we are told that heavy showers of rain fell, which have washed away much of the ashes. The colonists say that the ashes have proved an excellent top-dressing to the pastures.

A GROUP OF ROTIFERS.

Notes on the Genus Colurus.

To the April number of Science-Gossip I communicated some notes on the genus Euchlanis, family Euchlanidota, and with the Editor's permission I now follow with some notes on the genus Colurus, belonging to the same family. Many microscopists seem to have very vague and hazy ideas in reference to the more minute rotifers belonging to this family, and especially it would seem in regard to the genera Lepadella, Metopidia, and the genus now under consideration. In Science-Gossip for June 1884 I gave a figure and short description of a rotifer since identified as *Colurus deflexus*, but of the species of which I was then uncertain. In the following number a gentleman who described himself as "a constant student of the rotifers," informed me that my rotifer was a very common one; and, if I would consult "Pritchard" again, I should find it described under the head of Lepadella. I received private communications from numerous other microscopists, referring it either to Lepadella or Metopidia; while, strange to say, not one of them recognised it as undoubtedly belonging to the genus Colurus. Now, whatever imperfections there might have been in my description and figure, yet I clearly described it as having one unmistakable character, viz., the lorica being open on the ventral surface, a peculiarity possessed by no other genus but the one in which I placed it. I fear that the above instance is but an exemplification of the fact upon which I commented in my last communication, that too many "constant students of the rotifers" are satisfied with a merely superficial examination of their captures, and are quite content to identify them with any published figure to which they happen to bear a general resemblance. Such a method, if method it can be called, is not of the slightest scientific value, and is certainly not calculated to increase our knowledge of these interesting animals, or to assist brother naturalists in any of their difficulties. There is, however, some little excuse for them. Only those who have conscientiously endeavoured to surmount the numerous difficulties attending the identification of some of the more minute free-swimming rotifers can appreciate the perplexities and the amount of labour involved in arriving at a satisfactory result. The Micro. Dictionary affords the student very little assistance, as it gives a description of species in comparatively few instances, and these and its figures are almost invariably transcribed from Pritchard or other older authorities. Pritchard, while treating more fully of the various species, is yet sometimes very vague in regard to the less frequently recurring forms, and the description he gives is generally insufficient, frequently very loose and irregular, and in some cases even is hopelessly inaccurate. In explanation of this we must remember that object-glasses were not so good twenty-five or thirty years ago as they are now; that illumination was not so well understood; that observers were comparatively few; and that the minuteness and almost phenomenal restlessness of these animals all render the study of the Rotifera one of some difficulty, and call forth considerable manipulative skill. It is not sufficient in many instances to study them in one position only: they must be watched, it may be, for hours together, so as to study them in their various aspects, before we can gain an accurate idea even of their outward configuration. One may have an animal under observation, on frequent occasions, throughout the whole summer, and yet there may be one or more aspects of it of which one has failed to get a glimpse. In such a case the only alternative is to study and carefully sketch it in the aspects you do see it, and await a favourable opportunity, perhaps in the next summer, of completing its study. As a general rule the dorsal and ventral aspects are those most frequently seen in rotifers with a depressed lorica, and the dorsal and side aspects of those in which the lorica is compressed. In the genus Colurus, which belongs to the latter class, it is extremely difficult, and frequently impossible, to get a view of the ventral aspect, although it is absolutely necessary to do so—to all at least but an experienced student of these animals—before one can speak positively as to the genus.

The species of this genus are among the commonest Rotifera in this district (Rossendale), and are found

in almost every sheet of water or pond that supports rotiferan life of any kind. More especially I find them in shady wells, which here are built in the walls of many of our lanes, leading to the various farms on the hill-sides. Although common, I have never been fortunate enough to procure them in large numbers, as they are rather solitary in their habits, so that it is, generally speaking, somewhat of an accident when I come across them. In my aquaria I can generally find them on the sides nearest the light, foraging among the threads of confervæ and oscillatoriæ, which cover the glass like a close felt. It would seem however that, although by no means a rare rotiferan, it is only partially distributed, as Dr. Hudson informed me some two years ago that he had never seen a rotifer of this genus. The characters of the genus as given in Pritchard are as follows: "They have two frontal eyes, a furcate foot, and a compressed or cylindrical lorica. The lorica is said to be open upon the under-side; a compound rotary organ is present in all, over which projects a retractile frontal hook; an œsophagal bulb with two jaws, in two species with two or three teeth; the œsophagus very short; two species have a constricted stomach, the others have a simple alimentary canal, all with glands. The two red frontal eyes are delicate; in *C. uncinatus* and *C. bicuspidatus* they have escaped observation; all have peculiar vesicles at the back," subsequently said to be arranged in a circle.

A few notes upon some of these characters may be of interest, and I will take them in the order given. Owing to the dorsal arch of the lorica, it is, I believe, impossible to see the eyes on that aspect, and only one is visible on a side aspect, as, being situated rather low down, it is impossible to have them both in focus at once; but in the species in which eyes are visible they are no more "delicate" than in any other rotifer of a similarly small size. In my *C. uncinatus* I have not been able to detect them; but it is possible that a strong reflected light might render them visible, as in some other rotifers in which these organs are deep-seated. The grand distinguishing feature, however, is the ventrally open lorica; and if the student can get a glimpse of that aspect the rotiferan's identity is at once settled, but unfortunately this is, as previously stated, a matter of great difficulty in this genus, and calls forth all one's skill and patience, which are unfortunately not always rewarded. I give figures of the three aspects of *Colurus uncinatus*, to illustrate these various points. With reference to the "rotary organ" being "compound," I may say that in many of the genera, both of this family and that of Hydatinœa it is often difficult to determine the real character of the ciliary wreath (and also of the jaws); so much so that Dr. Hudson does not rely on them at all, but trusts to the "well-marked differences in shape and structure" of the lorica. The rotifers of this genus may, and probably do, have "two jaws" (mallei), but whether there are "two or three teeth" would, I imagine, be difficult to demonstrate. The "frontal hook" is now more correctly described as being "a retractile, arched, chitinous plate," but to the tyro its optical appearance presents many difficulties of interpretation. My experience as to the "vesicles" is that the circular arrangement, where it exists, is simply an accidental one, and that these bright yellow oil-globules, which stud the walls of the stomach, are not more numerous in this than in many other genera. I now give descriptions of species figured.

Fig. 119 represents the various aspects of a rotifer which I believe to be *Colurus uncinatus*. Characters: lorica (dorsal aspect) compressed, oval, anteriorly pointed, posteriorly somewhat truncated both on dorsal and side aspect; open on the ventral side, as in Fig. 119 *d*, with retractile frontal hood; foot three-jointed, toes furcate, about as long as the foot;

Fig. 119.—*Colurus uncinatus*.

eyes (if any) not detected; mastax small, details not clearly made out. Fig. 119 *a*, dorsal view, showing how the opening of the lorica reaches right up above the hood anteriorly, and the foot posteriorly; *b*, side view, animal swimming; *c*, side view, cilia retracted, and showing muscles by which the retraction is made; *d*, ventral view of lorica, showing the form of the opening. This is the commonest of the four species of this genus which I have found in this locality. Fig. 120.—In spite of some slight differences with previously published descriptions Dr. Hudson believes this to be *Colurus deflexus*. Lorica cylindrical, open on the ventral side, and with faint indications of a ridge on the anterior dorsal, which part is also pointed; posteriorly there are two well-developed spines (two-horned); tail-foot forked, toes about as long as foot; eyes, two. Fig. 121.—This differs from the last only in the posterior horns of the lorica being less pronounced, and in the toes being somewhat longer than the foot. Fig. 122.—In this species, on the dorsal aspect, the lorica is truncated posteriorly, in such a way that the lateral joints can hardly be said to partake of the character of horns; the toes, as in the last species, are rather longer than the foot, and the whole animal is broader in proportion to its length. In this specimen, as in the specimens of *C. uncinatus*, I have been unable to detect the eyes. I

cannot identify the two last species, with Pritchard's *C. bicuspidatus* and *C. caudatus*, as neither of them agree in all their characters with either of those species.

Those of your readers who are fortunate enough to possess the parts already published of Dr. Hudson's work on the "Rotifera" will perceive that the predictions in reference to the recasting of the genera in the family Euchlanidota have been more than verified. In his classification of the rotifera he has first divided them into four natural orders, according to their mode of locomotion and the structure of the foot. The first of these ideas appears in Dujardin's classification, and the second in Leydig's. To these orders he has given the following names :—

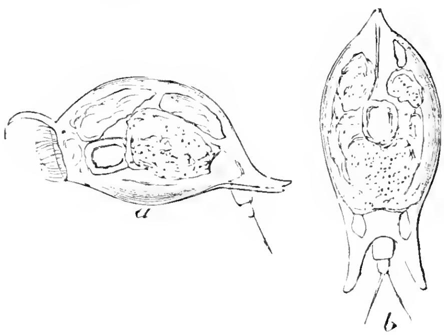


Fig. 120.—*Colurus deflexus.*

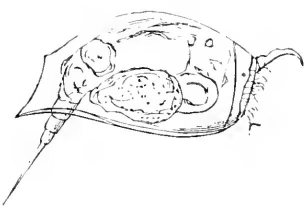


Fig. 121.—*Colurus sp.*

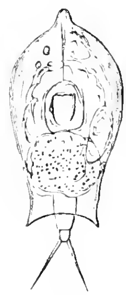


Fig. 122.—*Colurus sp.*

RHIZOTA (the rooted), which are fixed when adult. Ex.—Floscularia, Melicerta, etc.

BDELLOIDA (leech-like), that swim with their ciliary wreath, and creep like a leech, etc. Ex.—Rotifer, Philodina.

PLOIMA (the sea-worthy), that only swim with their ciliary wreath. Ex.—Notommata, Colurus, Brachionus, etc.

SCIRTOPODA (the skippers), that swim with their ciliary wreath, and skip with arthropodous limbs. Ex.—Pedalion.

He shows that the animals contained in these orders, with a few exceptions, differ from each other first, in their habits and, secondly, in the structure of the foot, in the arrangement of the ciliary wreath, and in the form of the trophi (jaws). The rotifers we have been considering belong, of course, to the sea-worthy order (Ploïma), an order containing no less than fourteen out of the nineteen families into which Dr. Hudson has divided the Rotifera. The genus Colurus is placed in the sub-order Loricata (in which the corona and ciliary wreath is various in shape, but never rhizotic, and bdelloidic only in the Pterodinadæ ; the trophi [jaws] are of different types, but never bdelloidic, and rhizotic only in the Pterodinadæ), and in the first division of that order, in which the animal's foot is jointed, stylate or furcate, not transversely wrinkled nor wholly retractile. This division comprises the following families : Rattulidæ, Dinocharidæ, Salpinadæ, Euchlanidæ, Lepadelladæ, and Coluridæ, the characters of the latter being given as follows : lorica compressed, open beneath ; head distinct, surmounted by a retractile, arched chitinous plate. This arrangement appears a very convenient one, and will, I believe, commend itself to students of the Rotifera ; but for a complete account of his different genera we shall have to wait for the subsequent parts of Dr. Hudson's great work. So far as this locality was concerned last summer was a complete failure in regard not only to this class of animals, but also in respect of the microscopic fauna generally. I trust, however, that the coming summer may make amends, and if this should be the case I intend thoroughly to work the few "ponds and ditches" of this locality, feeling assured from the experience of the past, both my own and that of other microscopists, that this is the only certain method whereby one may hope to compile an accurate and complete list of species.

J. E. LORD.

Rawtenstall.

GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

WHAT shall we do when our coal is exhausted ? Among the replies to this very practical question, that which is discussed by Mr. Starkie Gardner in a paper on the utilization of the internal heat of the earth is interesting and promising. A step in this direction has already been taken at Perth, in Hungary, where a well has been sunk to the depth of more than 3000 feet, from which water is already raised at a temperature of 161° Fahr., and the boring is to proceed until 178° is attained. At this temperature all the ordinary cookery operations of stewing and so-called "boiling" may be performed, most of them very much better than at 212°.

The extent to which this source of heat is practically available depends, of course, upon the average thickness of the earth's solid crust, or the depth at which the required temperature is reached. Mr. Gardner maintains that the movements of the crust of the earth correspond more nearly to a thickness of ten miles than of fifty, and I quite agree with him. There are

some speculative mathematicians who have "proved" (to their *own* satisfaction) that the earth is solid throughout. But the intellectual machinery used by these gentlemen is so powerful that an expert in its use can demonstrate anything his imagination may suggest whether true or false, reasonable or absurd. The question whether the increase of temperature which experiment has proved to proceed as we descend below the surface of the earth will continue similarly at still greater depths than we have yet attained, is a physical one to be proved or disproved by direct physical experiment. Everything that is at present known indicates the existence of a store of calorific energy, which, so far as human demand is concerned, is practically inexhaustible. We have but to tap it effectually and draw perennial supplies. Whether we shall avail ourselves of it or not will be determined simply by the cost of reaching it as compared with the cost of raising coal. The thickness of the earth's crust is better studied by observing its own movements directly (as in earthquake-waves), than by making complex calculations concerning the supposed astronomical influences of internal earth-tides.

Flies as Sanitary Inspectors.—My own experience and that of many friends concur in the conclusion that house-flies have been unusually abundant and vicious this summer. The reason is not very evident, unless it be that the short spell of hot weather we had earlier in the summer than usual brought them forth unusually. Having muttered many terrible denunciations of these disturbers of afternoon naps, my conscience insists on making amends by quoting a curious fact recorded in "The Sanitarian." Offensive odours were observed in a house in an American city, but their source could not be detected. The carpet of the offending room was raised, and a carpenter engaged to take up the floor, when it was suggested that the usual sanitary inspector should be superseded by a cheaper rival. Two bluebottles were brought from a neighbouring stable, and the doors and windows of the room closed. The flies proceeded to one of the spaces between the flooring boards, and on raising the floor at this part the remains of a dead rat in an active stage of decomposition were there discovered.

Flies have been accused of carrying infection by alighting on decomposing matter, and proceeding from thence to sugar basins, &c., but I am not aware that any direct experiments have been made on this subject. Their remarkable care in brushing themselves throws doubt on it. I have especially observed their proceedings in cleaning their feet by rubbing them against each other with a twisting or coiling action that must be very effective.

Nitrogenous Compounds in Rain-Water.—We are always taking nitrates out of the soil wherever it is cultivated and crops are reaped, and besides this the rains wash such easily soluble salts down to the rivers and thence to the sea. The question of how these are perennially renewed has long been discussed. Messrs. Berthelot and André have taken up the subject again ("Comptes Rendus," vol. 102, p. 957), and state that rain-water not only contains nitrogen in the form of ammonia, and in nitrates and nitrites, but also in the form of soluble organic compounds, which are not decomposed by boiling with alkalies, and in insoluble nitrogenous particles derived from the air. In analysing rain-water it is essential to estimate all the four quantities, and this should be done immediately after the fall of the rain, which should not be allowed to stand in the collecting apparatus for any considerable length of time, as opportunity would thus be given for the development of organisms derived from the air.

I should add in explanation, that the nitrogen so abundant as a constituent of atmospheric matter is curiously inert in its uncombined condition, and that one of the theories of the origin of nitrogenous compounds is that electrical discharges in the midst of this inert nitrogen and aqueous vapour effects the combination of nitrogen and hydrogen, *i.e.* the formation of ammonia; and from this, as a starting point, the formation of the nitrates, nitrites and their salts, is explained, as below.

Nitrification.—Until a comparatively recent period the mode in which nitrogenous organic matters are oxidized in the soil and converted into nitrates and nitrites, has presented a chemical puzzle. It is now solved in a fairly satisfactory manner. It appears to be due to the action of microbia, such as bacteria and other microscopic organisms that assimilate these organic compounds, and excrete them as nitrates and nitrites of the alkaline and earthy bases, and also of ammonia. These ammoniacal and other compounds thus formed supply food to the visible vegetation; are important natural manures. Thus the sewage of towns may become the food of microbia, the excretions and dead bodies of these the food of plants, and these plants the food of man, either directly as vegetables, or as the flesh of animals that have fed upon the vegetables.

Ensilage Compared with Hay.—Experiments with ensilage are still proceeding. L. Broekema and A. Mayer compared the yield of milk from two sets of cows, one fed for a definite period with hay, the other with sour ensilage from the same grass as the hay. These foods appeared to produce equal quantities of milk, but the fat in the milk of the ensilage-fed cows exceeded that in the milk of the hay-fed cows by 0·3 per cent., the other constituents remaining the same. The cows fed with ensilage lost weight.

From these and other experiments it appears that

there is much still remaining to be learned concerning the relative merits of ensilage and hay-making as methods of storing fodder. The results of such German and French experiments are by no means conclusive as guides to British farmers. Supposing that the ensilage and the hay from a given quantity of grass were of equal value as food, the question then to be decided is which method of storage is the most economical on an average of our seasons. In countries where harvest weather is reliable, hay-making must have an advantage as compared with humid and uncertain climates, and any experiments to be fully useful should be made with average hay; that is with hay made slowly in bad weather as well as with that made rapidly in good harvest weather.

Ensilage, skilfully conducted, always yields the same results, or very nearly so.

"The Spectre of the Brocken."—In the "Gentleman's Magazine" of May 1884, I described my own experience of seeing a fine display of this on Arthur's Seat on two occasions. The first was unexpected, when I happened to be accidentally on the summit at sunset while a mist enveloped Edinburgh and the country around, barely extending upwards to the place where I stood. Every time a rag of the lower mist rose sufficiently high to envelope me I saw a lanky gigantic image of myself projected upon, or rather through it, the magnifying effect being an illusion due to the forward projection through a long depth of the thin mist. The shadow was no taller than myself, but its horizontal length was from 50 to 100 feet or thereabouts. On the second occasion, I ascended the hill with the purpose and expectation of witnessing a repetition, and was not disappointed. The city was enveloped in a mist or ground fog, evidently of no great upward extension, which, as before, clung to the sides of the hill and was blown away from the summit.

In my description above referred to, I expressed an opinion that it is a much more common phenomenon than is usually supposed; the conditions of its appearance being simply a mist just reaching, and occasionally overtopping, any mountain summit or elevation when the sun is near the horizon. This opinion is confirmed by two accounts recently published in "Nature," one, April 8th (p. 553), by Hon. Ralph Abercromby, who saw from Adam's Park, in Ceylon, nearly the same as I saw on Arthur's Seat under corresponding conditions, plus a rainbow and curious shadow of the mountain itself. The other account (July 8th), is from a part of the world far distant from this, viz., Hawaii. Mr. J. M. Alexander, who ascended one of the craters of Hualalai with Mr. J. S. Emerson, tells us that "just before sunset we saw the splendid phenomenon of the Spectre of the Brocken, our shadows on the mist, encircled with rainbows over the black inferas."

Bugs.—"Adversity makes us acquainted with strange bedfellows," says the old adage. Science does the like, as may be seen by reference to the "Comptes Rendus" of July 5th, which contains a contribution from M. J. Künckel on the seat of the fetid secretion of the house bug, which he finds to be in the dorsal and abdominal glands of the larva and nymph, and the sternal thoracic glands of the adult. I am not an entomologist, but in my boyhood made some experiments with these interesting animals. I was told that they only took food at long intervals, and this stimulated my curiosity. To test it, I obtained some specimens, kept them in pill-boxes until they became very flat indeed, then fed them on my arm, watching with a magnifier the insertion of the long tubular proboscis, and the gradual swelling out of the abdomen of the creature as it obtained its accustomed nutriment. I found that in warm weather they flattened again in the course of a few weeks and were ready for another meal, but that in the winter, they remained very little altered during periods of three months or more, and continued alive from the autumn until the spring in the solitary starving confinement of the pill-box.

On opening one of the pill-boxes after a much shorter period than this, I found a brood of young, all, as I supposed, perfect, neither larva nor nymphs were there. The juveniles were full of blood and shaped like the parent, but longer, and rather pointed at the posterior extremity. They were very active, and I supposed that they were hatched out in that form directly. Perhaps I was mistaken; these may have been, in spite of their familiar appearance, but larva. Some of our entomological readers may be able to set me right. They were little bigger than pins' heads.

Another casual item of experience shows that we have yet much to learn in this region of zoology. In the course of a tedious voyage from Constantinople to London in a small schooner, the monotony was broken by awakening with a disgusting savour. I presently learned that a specimen of the above had fallen from the ceiling of my berth into my mouth, and that I had crushed the innocent creature between my teeth. This turned me out of bed altogether. On getting a light I found that the opportunities of zoological research were unlimited. Specimens were swarming on the aforesaid ceiling, and throughout the cabin. I dressed hastily and took refuge on deck. Presently I was followed by all the crew, who arose in like manner long before eight bells. Cabin and forecastle alike were similarly invaded, and measurable but uncountable quantities were swept together into dust-pans and thrown overboard. This occurred in July somewhere in the neighbourhood of Algiers; weather very hot. We had not been troubled with these fellow-passengers previously. Is this a common nautical experience?

A Cheap Antidote to Snake Poison.—In the

"Popular Science Monthly" (New York) of May last is an account of a curious case by Bernard Bienenfeld of San Francisco. A dog was bitten on the nose by a rattlesnake. The dog suffered for a few days, but did not die. He became transformed from a sprightly and intelligent animal to a sickly and stupid one. He was emaciated and miserable, and his vision was greatly impaired; "in fact, all his faculties seemed to be benumbed." Some time after, this dog was taken to the banks of the Upper Sacramento River in the autumn, when they are lined with the decaying bodies of "dog salmon," *i.e.* salmon that have died from exhaustion while endeavouring to ascend the river for spawning. The bitten dog and other "canine camp-followers partook voraciously of this free salmon-feast, with the result that all of them, with one single exception, died, with every indication of being poisoned. The single exception was the young dog that had suffered from the rattlesnake bite. He apparently suffered no discomfort from his meal; and, strangest of all, from that time became a well dog! He regained his youthful elasticity of spirit and became robust." Mr. Bienenfeld adds that "when I last saw him he was as playful and intelligent a dog as I have ever seen." The question suggested is, whether there is developed in salmon, and possibly in other decaying fish, a counter-poison to that of the rattlesnake, and Mr. Bienenfeld asks for further investigation of the subject in this direction. I think he is well justified in doing so. Vaccination and other forms of innoculation operate on the principle of killing one form of disease-poison by the presence of another, and therefore the hypothesis that poison of the putrid salmon poisoned the poison of the rattlesnake is not unreasonable.

CHAPTERS ON ANIMAL PARASITES.

By W. A. Hyslop.

No. V.

We now enter upon the second division of the Mallophaga, viz. those having the antennæ clavate.

1. Colpocephalum.—This and the next genus, the Menopon, are perhaps the two most difficult to distinguish, and are, at the same time, the only two genera of this second division of the Mallophaga which are anything like common. In a short article like the present it would be impossible to enter upon the minute differences between them; but a reference to Figs. 123 and 124, which are typical examples, will show the chief differences.

2. Nitzschia.—There are only two species of this genus, both of which are found on the swift, and bear a strong resemblance to a Menopon, only they are larger and more robust.

3. Læmobothrium contains but few species, all of which are of large size and rare. The largest of all the known Anoplura, *L. titan*, belongs to this genus. The structure of the head (see Fig. 125) is an unfailing guide in distinguishing the genus.

4. Trinoton.—This, though commoner than the last genus, is also rare. The species somewhat resemble the Menopon, but are generally of larger size, and the legs thicker and shorter. The most common is that found on the goose, though this is not the common goose parasite.

5. Physostomum.—This genus contains a few parasites, all of which are rare, and seem to be confined to song-birds. The structure of the head (see Fig. 127) is again the distinguishing feature. The species are tolerably large in size, and never found in large numbers, that infesting the chaffinch being one of the most common, though a great number of chaffinches may be examined before a single specimen is found.

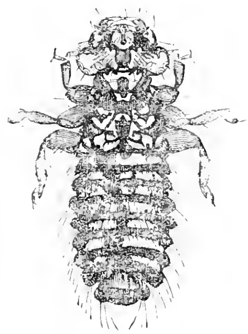


Fig. 123.—Colpocephalum of Rook. × 60.

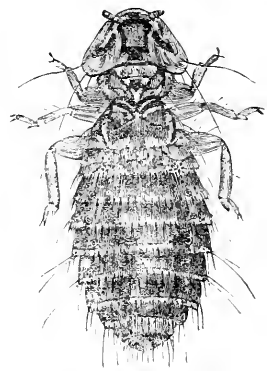


Fig. 124.—Menopon of Piliated Jay, ♀. × 60.

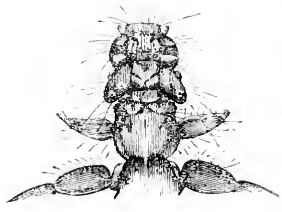


Fig. 125.—Head and part of thorax of Læmobothrium of Kite.

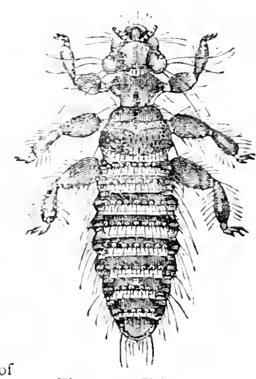


Fig. 126.—Trinoton of Swan.

6. Eureum.—This is the rarest of all the Anoplura, and contains only two species, one found on the swallow, and the other on the swift. The British Museum contains one specimen, and probably it is the only one in any collection in Britain. Fig. 128, taken from M. Piaget's book, shows the appearance

of this rare parasite, which, it will be seen, is not unlike a Menopon.

7. Gyropus.—This, which is the last genus, also contains two species, both of which are found on the guinea-pig, and are not uncommon. The one, *G. gracilis*, is long and narrow, the other, *G. ovalis*, short and broad. They are small parasites, and look to the naked eye very like small pieces of straw.

I have now run very rapidly and imperfectly over the various kinds of Anoplura, and hope that my description and illustrations will be sufficiently clear to enable any one to classify any specimens he may have, and thus give zest to the study of parasites, a

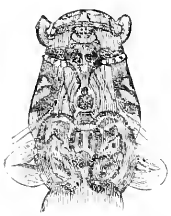


Fig. 127.—Head and part thorax of Physostomum of Chaffinch. × 60.

Fig. 128.—Eureum of Swift.

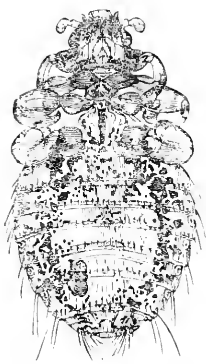


Fig. 129.—Gyropus of Guinea Pig, ♂. × 60.

study the interest of which is, I am sure, surpassed by no field of science.

All the illustrations, with two or three exceptions, are photographed from specimens in my own cabinet, and are chosen with a view of showing typical examples of each genus.

In deference to the views expressed by the Editor in the August part of SCIENCE-GOSSIP, I now add a few words regarding the collection and preparation of animal parasites.

As regards the collection of specimens, it may be truly said that parasites are to be found everywhere, as species infest almost every living creature. In the case of birds, the parasites will generally be found on the barrels of the feathers, which should be turned back one by one.

Some species, such as the Docophori, are most plentiful about the head, while others are most abundant on the wings. The species of the genus Dermaleichus look like fine dust, and are most easily seen by looking through the feathers at a strong light. Parasites may frequently be found on dried skins as well as on newly-killed birds, and when placed in turpentine or glycerine generally regain their former shape and size, though, in such cases, we cannot rely implicitly on this result being attained. As a rule, parasites are not found so plentifully on mammalia as on birds, and blood-sucking species must be looked for while their hosts are yet warm, as they leave, apparently, as soon as the blood begins to cool; this is especially the case with fleas.

As regards the preparation of specimens, not much requires to be said. The best method for scientific investigation is undoubtedly to mount in cells, in glycerine, though for micro-photographic purposes this process is unsuitable. The usual method of mounting in balsam, if carefully carried out, need not to any great extent injure the specimens. If possible, caustic potash should not be used, and care should be taken not to flatten the object by pressing down the cover on the slide. My usual method is to soak the parasites, for a shorter or longer time, according to their size and colour, in turpentine, then place them on the slides, lay the glass cover over them, and allow the balsam (dissolved in chloroform) to run in. The resulting slides would look better if cells were used, as the covers would then be quite flat. Some of the minute Acari are much too transparent if mounted in balsam, and for these, glycerine is the proper medium, thin cells of varnish being necessary.

If caustic potash must be used, caution is required not to carry it too far, and produce specimens which are mere ghosts, so to speak—a fault which I have found by no means uncommon, even amongst professionally-mounted slides.

ON THE VARIATION AND CONTINENTAL DISTRIBUTION OF THE BRITISH SLUGS.

By J. W. WILLIAMS, D.SC., ETC.

[*Continued from p.* 148.]

LIMAX CINEREO-NIGER, Wolf.—This species is generally distributed over the Continent, but is said to be rare in England, where it has no doubt been often described as a variety of *Limax maximus*, Linn. In France, Bourguignat has recorded it from the Nord and the Isère; Lallement and Servain from the Aisne; Baudon from the Oise; Mabille and Jousseaume from the Seine-et-Oise and

the Seine-et-Marne; Drouët from the Vosges; Morelet from Alsace; Dumont and Mortillet from Savoy and Haute-Savoie; Locard from the Rhone and the Ain; Dubreuil from Hérault; and Lecoq from Auvergne.

Var. *leucogastra*, Morch.: animal brown, banded, foot unicolor, white. French.

Var. *cinereo-nebulosa*, Malm.: animal whitish, mantle and keel pale yellow, approaching to a cloudy ash colour; hinder portion of abdomen spotted; foot unicolor, whitish. French.

Var. *fasciata*, Westerl.: animal ashy, with five wide undulating black bands. Scandinavian.

Var. *flavescens*, Westerl.; animal yellowish unicolor; foot obsoletely bicolored. Scandinavian.

Var. *alba*, Paasch: animal white, unicolor.

Var. *vera*, Dumont and Mortillet: animal ashy-black, with two black bands on each side. Found in Savoy and Haute-Savoie, but rare. French.

Var. *subinterrupta*, Dumont and Mortillet: animal like the preceding, but with the bands interrupted. French. Rare. Savoy and Haute-Savoie.

Var. *efasciata*, Dumont and Mortillet: animal brown, bandless. French. Rare.

Var. *pallescens*, Dumont and Mortillet: animal whitish, more or less pale (= var. *alba*, Paasch?). French. Savoy and Haute-Savoie.

Var. *albipes*, Dumont and Mortillet: animal brown, with the external and inferior side of the foot white. French. Found in the environs of Bonneville.

Var. *luctuosa*, Moq.: animal very black, with the keel yellowish, differing from the type in the keel being reduced to one-half or two-thirds. French. Found near Grand-Chartreuse in Isère.

Var. *nigra*, Moq.: animal wholly black. Found in France near Grand-Chartreuse, and in Savoy and Haute-Savoie. (= var. *maura*, Held.) (In Italy this variety was found by Lessona in Piemonte.)

Var. *Pavesii*, Pini: animal dark chestnut with lateral blackish-blue bands on the sides. Italian. Pini found this in Lombardy, and Paulucci in Tuscany and Piedmonte.

Var. *Camerani*, Lessona and Pollonera: animal small, dark chestnut, with the keel and dorsal zone dirty white. Length, 8–10 cent. Found by Lessona at Maccugnagna. Italian.

Limax arborum, B.-Ch.—This is a local slug in England. In France, Bouchard-Chautereaux at Pas-de-Calais; Morguet in the Nord; Servain in Aisne; Mabille and Jousseaume in Oise, Seine-et-Oise, La Seine, and in Seine-et-Marne; Fischer in Mont-Dore; Millet in Maine-et-Loire and Mayenne; Fagot in Lozère and Ariège; Dubreuil in Hérault; and Mabille near the North-Coast. In Italy it seems to be moderately common, and Lessona describes, under the name of *Lehmannia marginata*, Müll., three new varieties as occurring in that country.

Var. *nemorosa*, Baudon: animal like the type, but with two longitudinal blackish bands on the back, and with the sides often spotted; keel short. French, Italian.

Var. *Bettoni**, Sordelli: animal ornamented on the back with white and fuscous spots; median band white, with two accompanying fuscous bands; median band on mantle white, with two alternating white and fuscous lateral bands; keel short. Italian.

Var. *Alpestris*, Less.: animal with the keel larger up to one-half of back; shield often with obscure confused blackish bands; back with a pale median band. Italian.

Var. *pallens*, Less.: "pallescens, dorso, zonula pallida, et usque ad ⅔longitudinis carinato; clypeo pallido, zonis obscuris subobsoletis." Italian.

Var. *rupicola*, Less.: "minor, nigricans; zonula pallida, dorsali obsoleta vel nulla, carina subtillissima usque ad ⅔dorsi producta, clypeo subuni-colore vel omnino nigro." Italian.

Testacella haliotidea, Drap.—Besides being found in England, this snail-slug exists in a great part of Europe, and more particularly in the central mountainous regions, Corsica, Sicily, Spain, Portugal, Algeria, Madeira, and the Canary Isles.

Var. *flavescens*, Moq.: animal canary-yellow, shell a little larger anteriorly than posteriorly. French.

Var. *albina*, Moq.: animal whitish or dirty white; shell larger in front than behind. French. Found by Sarrat at Toulouse.

Var. *ovalis*, Moq.: animal yellowish-grey, shell subelliptical or oval. French.

Var. *scutulum**, Sowerby: animal yellowish; shell narrower in front than behind.

Subvar. *pallida**, Cockerell: animal pale yellowish, without markings.

Subvar. *aurea**, Cockerell: animal orange with brown markings.

Subvar. *albida*, Cockerell: animal pure white. Gibraltar.

Var. *Companyonii*, Moq.: shell large, narrower in front than behind (*vide* Dup., The colour of this is not given. "Hist. Moll." 1847). French. Companyo found this in the Oriental Pyrenees.

Var. *bisulcata*, Moq.: animal spotted with brown-red above, yellow or orange on the sides; shell small, very depressed, narrower in front than behind. French. Found by Monton in the Var.

Testacella Maugei, Fér.—This slug was probably imported with some exotic plants into England. It was first found, where probably it was acclimatised, in the Bristol Botanical Gardens in 1830. A green variety, *viridans*, has been recorded as British.

There are two doubtful varieties recorded of *Geomalacus maculosus*, Allman, as Irish, but of which I cannot find any descriptions. They are var. *Allmani*, Heyn, and var. *Verkrareni*, Heyn. Forbes and

Hanley surmise that this peculiarly Irish slug will be also found to be Asturian.

Of *Limax lævis*, Müll., and *Limax tenellus*, Müll., I have been unable to find any recorded varieties. Lessona and Pollonera, in their monograph, record the former from Piedmonte and the valley of the Po, in Italy, and the latter from the Piedmontese Alps, and from the Val della Toce.

The following works have been consulted in the preparation of this paper:—

Emil Adolf Rossmassler: "Iconographie der Land- und Susswasser Mollusken," Dresden, 1835.

Forbes and Hanley: "History of British Mollusca," London, 1853.

Alfred Moquin-Tandon: "Histoire naturelle des Mollusques de France," Paris, 1855.

Ralph Tate: "Land and Freshwater Mollusks of Great Britain," London, 1866.

Arnould Locard: "Malacologie lyonnaise," Lyons, 1877; "Études sur les Variations malacologiques," Paris, 1881; "Prodrome de Malacologie française," Paris, 1882.

Carl Agarth Westerlund: "Fauna Molluscorum Terrestrium et Fluviatilium Sveciæ," Stockholm, 1872.

Dr. O. Boettger, in "Jahrb. deutsch. Mal. Gesel."

Lessona and Pollonera: "Monografia dei Limasidi Italiani. Memorie della Reale Accademia delle Scienze di Torino," serie seconda, tomo xxxv.

27 Corinne Road, Tufnell Park.

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

It appears that there has been a decided falling-off in the number and magnitude of the sun-spots as compared with those observed in the previous six months. In March there was a temporary increase, and on the 8th of May a magnificent group of spots was visible in the sun's northern hemisphere.

The solar prominences also show a considerable reduction in number and size compared with those seen in 1885, but the fluctuations are much fewer than in the case of spots. This seems to prove that there is no intimate connection between the two classes of phenomena.

Mercury will be at the least distance from the sun on September 7th, at five in the morning.

Venus will be at the least distance from the sun on September 18th, at nine in the evening.

There will be no occultations of stars as large as the fourth magnitude.

In September, Mercury will be a morning star. Venus will be a morning star. Mars will be an evening star. Jupiter will be too near the sun for observation.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
Mercury ☿	3	3 33M	10 51M	6 9A
	10	3 58M	11 3M	6 8A
	17	4 42M	11 24M	6 6A
	24	5 30M	11 45M	6 0A
Venus ♀	3	3 2M	10 32M	6 2A
	10	3 22M	10 38M	5 54A
	17	3 45M	10 44M	5 43A
	24	4 7M	10 49M	5 31A
Mars ♂	3	10 45M	3 31A	8 17A
	10	10 44M	3 22A	8 0A
	17	10 44M	3 13A	7 42A
	24	10 44M	3 5A	7 26A
Jupiter ♃	3	7 52M	1 43A	7 34A
	10	7 33M	1 21A	7 9A
	17	7 14M	0 59A	6 44A
	24	6 55M	0 37A	6 19A
Saturn ♄	3	0 30M	8 34M	4 38A
	10	0 5M	8 9M	4 13A
	17	11 36A	7 44M	3 48A
	24	11 12A	7 19M	3 22A

Meteorology.—The mean reading of the barometer at the Royal Observatory, Greenwich, in the week ending 17th July, was 29.71 in.; the variation being from 30.00 in. to 29.25 in. The mean temperature of the air, 60 3, was 3.0 below the average. Rain fell on five days of the week to the aggregate amount of 0.96 of an inch. During the week 28.3 hours of bright sunshine were registered, against 40.4 hours at Glynde Place, Lewes.

The mean reading of the barometer at the Royal Observatory, Greenwich, for the week ending 24th July, was 29.63 in. The variation was from 29.90 in. on Tuesday to 29.29 in. on Friday. The mean temperature of the air was 64.9, and 1.9 above the average in the corresponding weeks of the 20 years ending 1868. Rain fell on three days of the week to the aggregate amount of 0.58 of an inch. During the week 48.2 hours of bright sunshine were registered against 39.6 hours at Glynde Place, Lewes.

At the Royal Observatory, Greenwich, in the week ending 31st July, the mean reading of the barometer was 29.61 in., the variation being from 29.29 in. to 29.94 in. The mean temperature of the air was 59.4, and 3.2 below the average in the corresponding weeks of the 20 years ending 1868. Rain fell on four days of the week, to the aggregate amount of 0.93 of an inch. The duration of registered bright sunshine in the week was 22.3 hours, against 30.5 hours at Glynde Place, Lewes.

At the Royal Observatory, Greenwich, the mean reading of the barometer for the week ending 7th August was 29.79 in., and the variation was from

29.97 in. to 29.47 in. The mean temperature of the air, 60.2, was 2.5 below the average in the corresponding weeks of the 20 years ending 1868. Rain fell on two days of the week, to the aggregate amount of 0.15 of an inch. The duration of registered bright sunshine was 31.0 hours, against 31.1 hours at Glynde Place, Lewes.

At the Royal Observatory, Greenwich, the mean reading of the barometer for the week ending 14th August was 29.69 in.; and the variation was from 29.90 in. to 29.35 in. The mean temperature of the air, 61.0, was 1.7 below the average in the corresponding weeks of the 20 years ending 1868. Rain fell on five days of the week, to the aggregate amount of 0.67 of an inch. The duration of registered bright sunshine in the week was 27.3 hours, against 28.5 hours at Glynde Place, Lewes.

In September the average mean temperature for Newcastle is 55°, for York 66°, for Liverpool 57°, for London 58°, and for the South Coast 59°.

The average rainfall for places east of Oxford from Hull to Beachy Head is 2 inches; for inland places west of Oxford, it is 3 inches, and on the West coast it is from 4 inches to 5 inches.

OUR BRITISH SAW-FLIES (SIRICIDÆ).

By Joseph Anderson, junior.

THE Siricidæ are very interesting insects, belonging to the order Hymenoptera, which includes the bees, wasps, ants, saw-flies, etc.; the Siricidæ being a family placed in the division of Hymenoptera with ovipositors, the females possessing an organ (sometimes, as in the Sirices, of considerable length) which is horny, and sufficiently rigid to penetrate the bark and wood of trees, in which by its means the eggs are laid.

One species, *Sirex gigas*, with its orange-and-black banded body, is so well known that any description is unnecessary; but, judging from the scanty records of its occurrence in the entomological magazines, a closely allied species, *Sirex juvencus*, is a rarity in Britain. It may be well, therefore, to record the capture of two specimens almost simultaneously in Bognor and Chichester. The first was taken on September 27th, in the Vicarage, and is now in the possession of Alfred Lloyd, Esq., F.E.S., etc. The Chichester insect was captured in the house of Dr. Arthur E. Buckell a few days earlier, being secured by Mrs. Buckell in her bedroom, by whom it was kindly presented to me. It was the first time that I have ever had the pleasure of seeing the insect alive. Both specimens are females, and my own has deposited a number of snowy-white spherical eggs, whether fertile or not I am unable to say. They present no particular appearance under the microscope calling for comment.

Juvencus differs from *gigas* in being of a uniform shining metallic blue colour, and is somewhat smaller, though the variableness in size of the internal-feeding saw-flies is very remarkable.

Curious stories illustrative of the strength of jaws of the larvæ, and indeed of the perfect insect too, and the length of duration of the larval state are on record. For instance, it seems that during the Crimean War some bullets supplied to the French army were found to have been riddled with holes, the mischief being traced to some larvæ of *Sirex juvencus*. These had been made up in the packing-

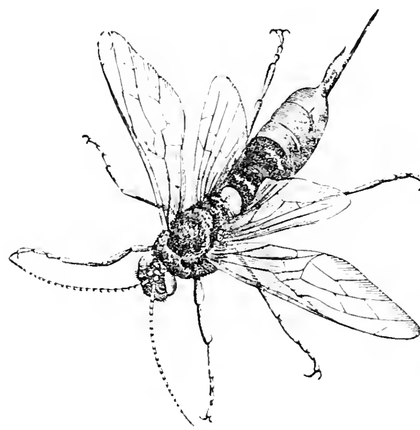


Fig. 1,o.—*Sirex gigas* (female).

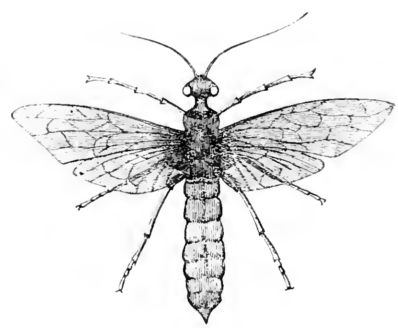


Fig. 131.—*Sirex gigas* (male).

cases, which were of pine, from which escaping, the larvæ made their way into the cartridges, gnawing through them, and even eating the leaden bullets.*

It is related by Kirby and Spence that "several specimens of *Sirex gigas* were seen to come out of the floor of a nursery in a gentleman's house, to the great discomfiture both of nurse and children. The story is told by Mr. Marshman on the authority of Sir Joseph Banks; and a similar circumstance, stated by Mr. Ingpen, occurred in the house of a gentleman at Henley, from the joints of the floors of which

* Figuier.

whole swarms—literally thousands—of *Sirex duplex* (Shuckard) emerged from innumerable holes, large enough to admit a small pencil-case, causing great terror to the occupants. As the house had been built about three years (the joists of British timber), there could be no doubt of the larvæ having taken more than that time in arriving at the perfect state."

The larvæ of the Sirices feed upon the wood of fir-trees, and in Northern Europe and America are sufficiently numerous to do some amount of mischief;

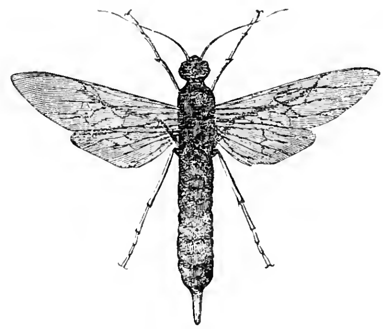


Fig. 132.—*Sirex juvencus* (female).

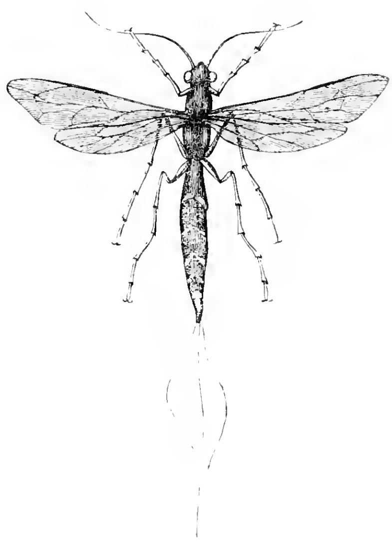


Fig. 133.—*Ryssa persuasoria*.

but their numbers are kept in check by a parasitic hymenopteron named *Rhyssa persuasoria*, the female of which, with an instinct almost incredible, finds out the Sirex larvæ concealed and feeding in the pine-wood, and through some tiny crack or crevice introduces the long ovipositor, and, darting it into the unfortunate caterpillar, deposits with each stab an egg. The Sirices and Ephialtes afford excellent examples of the two sub-orders of Securifera and Peteolata into which the Hymenoptera are divided; in the former the abdomen is attached to the body without any contraction at the juncture, whilst in the latter it is "insected" or nipped in.

Two or three summers ago, when *Sirex gigas* appeared in some numbers here, I obtained a specimen of *Rhyssa persuasoria*, which was at rest upon a heap of manure, and is probably the largest specimen ever taken. The dimensions given by Ratzeburg are from six to ten lines long, occasionally fourteen; but my specimen even exceeds the latter measurement.

Information respecting *Sirex juvencus* and its claims to be reckoned a British insect is certainly desirable, and if these few notes elicit correspondence upon the subject my object in writing them will be attained.

For the excellent illustrations to these notes, I am indebted to my kind friend Miss Millicent Detta Houghton.

MINERALOGICAL STUDIES.

No. III.

THE district of Killiney, in the county of Dublin, alluded to in the last paper,* consists almost exclusively of primitive rocks; and although their constituent minerals, whether constant or accidental, can hardly be said to be very numerous, they afford many specimens full of interest for the student. In particular, the granite vein which skirts the coast from Blackrock, and suddenly terminates in Killiney Bay, striking off to the south-west, contains several remarkable features, especially in its felspathic element. Whilst crystalline form in the felspar may be considered as rare, and inferior in definition to the well-formed crystals to be found in the Mourne district in the county of Down (which are also remarkable for their association with beryl, tourmaline, topaz, &c.), it is still possible to obtain masses highly characteristic of this interesting mineral. I have more than once picked up pieces showing very fairly defined faces of ∞P. $\infty R \infty$. OP. Cleavage faces in these forms are of course common enough, with varying degrees of perfection. There are few minerals in which the phenomenon of cleavage can be studied more instructively than in the various felspars, though the angular variations which often indicate differences of species can be determined only by very accurate measurements, seeing that there is frequently a difference of but a few minutes more or less from the 90° which distinguishes the orthose or monoclinic species. The cleavage on the basal section of orthoclase is very perfect, and as a rule renders the mineral unmistakable, whilst that on the clinopinakoid in not much inferior. There is also a peculiar glassy, and sometimes nacreous appearance, which is present with greater or less distinctness in all the numerous varieties. The main chemical elements are generally ascertainable with

* No. 238, page 219. October, 1884.

facility, the presence of potash being conspicuous. But it happens that all these features are common to another species, called microcline, which the best authorities have recently differentiated as crystallizing in the triclinic system. For a considerable time microcline was regarded as an orthose felspar, until the angle over the edges of the basal plane, and the section corresponding to the clinopinakoid was ascertained, after careful measurement by Des Cloiseaux and others, to possess a value as high, even, as 90° 30′, which of course would place it amongst the triclinic varieties, though in chemical composition and other respects very closely approaching the monoclinic. The great distinguishing feature, however, of microcline is the peculiar appearance of its structure on the basal section as viewed by a strong lens. It would seem as if the surface were composed of fibres crossing each other at right-angles, almost exactly resembling the warp and weft arrangement of some coarsely-woven material. The felspar in the district above mentioned partakes largely of this character; in fact, it would be difficult to find a piece whose basal section would not present more or less of the appearance described. There are at present on my table half-a-dozen pieces, taken at random from different spots, in which the lines are visible to the naked eye. The variety described is generally pure white, and is different from the cream-coloured kinds found in other localities. It is also largely sprinkled with well-defined crystals of essonite, mentioned in a former paper. The existence of the triclinic felspar, albite, has been satisfactorily determined in this formation, though it has only been found in very small crystals in certain cavities in the granite, in a particular spot near Dalkey; in general it seems to be in the pasty condition, but its chemical composition has been ascertained with accuracy by Rev. Dr. Haughton, who has given a good deal of study to these rocks.

The mica is also a most interesting feature of this district, both white and black varieties occurring in well-defined masses. In some portions of the granite the black appears to predominate, and contributes to make the rock appear coarse, whilst in others the white or margarodite mica (according to the above-mentioned authority) is equally conspicuous. A very remarkable feature in this latter kind is frequently to be observed, and in fact is regarded by mineralogists as peculiar to the district, and that is the arrangement of the crystalline plates or scales in a distinctly plumose form. In a hand specimen picked up from a loose heap, and principally consisting of a ground mass of felspar with occasional lumps of quartz, the mica is seen to radiate from particular directions, suggesting the form of a Prince of Wales's plume. In another portion of the granitic formation situated at Glancullen, some distance further inland, the plates of white mica are not only largely developed, but show distinct traces of a feathery construction on the faces of the lamellæ, which may be due to twining. This district, however, offers so many remarkable features as to merit a separate paper. In the hand specimen alluded to above, the arrangement of the mica gives a beautiful silvery appearance to the stone, but it is to be remarked that the usual crystalline form of the mineral is scarcely definable. In the white mica of this district, the potash is found to exist in a proportion of nearly eleven per cent., and iron peroxide to the extent of 4.5 per cent. The crystals being biaxial, the optical angles vary in certain localities from 53° 8′ to 76° 15′.

The mineral known as schorl, or black tourmaline, cannot be said to be a prominent constituent of the granite in this neighbourhood—at all events to the extent seen in the Cornish granites—though it would not be correct to call it rare. It is well known that schorl is frequently found in granite in the vicinity of a junction between that rock and others, and there is reason for believing that this is the case with the granite under consideration, as it has been found in Dalkey and other places adjacent to the mica schist which immediately adjoins it. In examining the structure of this latter rock, I picked up one day a mass of schist in which several layers of a black crystalline matter were embedded. Believing it at first to be hornblende, I paid no particular attention to it; but a certain definition in the crystalline mass of a distinctly different character from that of hornblende, combined with the absence of cleavage-planes, calling for a closer examination, a hand-lens soon revealed it to be black tourmaline. Further, the application of Turner's test with bisulphate of potash and fluor spar, by means of the blowpipe, showed traces of boric acid which is generally associated with black tourmaline. In passing some time since by a boundary wall of granite from the district, I observed one of the blocks, about fifteen inches square, to consist of crystalline felspathic paste sprinkled with a black shining mineral in radiated masses, which on close inspection proved to be schorl, and probably this would be found to be no isolated occurrence.

Perhaps one of the most interesting facts to be noted in the Killiney district is the occurrence of chiastolite slabs in the mica schist. The mineral is found in stellate masses on cleavage planes of the rock, and, being of a dark colour, these forms are easily distinguished against the brownish gray schist. Beyond these peculiarities there is little to distinguish the character of chiastolite, as its chemical formula is practically the same as that of andalusite, being a hydrated silicate of alumina with trifling accidental admixtures of ferric oxide, magnesia, &c., and varying according to locality. Andalusite is known to occur in some abundance in the same rock formation, though at some distance off in the adjoining county of Wicklow. Specimens, however, have been found now and again in the Killiney district, but at rare

intervals. The test for hardness in the chiastolite forms cannot be relied on owing to weathering; but the density of certain apparently compact masses approached closely enough to the usual degree, *i.e.* 29·3. In some aggregated forms on the surface of a piece of mica schist which I took some time since from a spot on the southern slope of Killiney Hill, there would seem an indication of the mineral staurolite which is also known to occur in schistose formations; the rhombic prism appearing distinctly accompanied by what looks like the macrodome. This specimen is, however, weathered, and somewhat decomposed, so that its hardness and specific gravity could hardly be ascertained with accuracy. The same objection would also interfere with a chemical analysis, to say nothing of spoiling the crystalline form by breaking up; however, the chief points of difference between the staurolite and the andalusite, or its variety chiastolite, would be a smaller amount of silicate of alumina, but with a proportion of protoxide of iron varying from 13 to 18 per cent. with magnesia, and probably some other oxides, but in other respects the minerals mentioned may be considered to be more or less allied.

Beryl has also been found in the granite of Killiney, and specimens are shown in the Dublin Museums, though I have never succeeded in finding one myself in the district. The variety would seem to be of a pale greenish-white, possessing the usual degree of hardness, but no approach to translucency. None of the specimens I have seen have exceeded a couple of inches in length by half an inch or so in diameter; but they are interesting by comparison with beryls obtained from other districts in Ireland. In the Mourne mountains, already alluded to, beryl is found with crystalline granite in beautiful sharply-defined prisms. Of much the same colour as the Killiney beryl, but occasionally in the form known as the white beryl, transparent as glass, and showing, in addition to the prism, various modifications of pyramids, &c.

In a future paper I propose to enter more fully into the character of the beryls found in the Dublin district, as they present many features of interest to the mineralogist.

Another mineral associated with this locality is that known as Killinite, which is believed to be a variety of spodumene. It does not exist in any abundance, and is only met with occasionally. It differs, however, from spodumene in not showing any traces of lithia, which exists in the latter mineral often to the extent of five or six per cent.

Hornblende is found in the Dublin granite, frequently in well-defined crystals in the felspathic paste, but I do not think has ever been noticed in isolated crystals, as it is known to occur in Cornwall. A microscopic section of a typical piece of local granite possesses a high degree of interest, and the hornblendic element is often sufficiently definite to be studied with full deliberation when the various characters as described in Zirkel's "Mikroskopische Geschaffenheit der Mineralien und Gesteine" can be well observed. The transverse lines in the microcline are also well brought out in this manner, together with the structural form of essonites, &c. In the felspathic paste under the microscope, there may be observed abundance of microliths of the outline associated with the Carlsbad twin form, and others apparently of hexagonal shape radiating in all directions, which, if the statements of the authority just mentioned be adopted, we might assume to be aciculon forms of apatite, but as to this it is not easy to speak definitely. The subject, however, is deserving of attention, and it might be found that a systematic microscopic examination of these granites by a competent observer would afford evidence of the presence of a larger number of accidental minerals than has hitherto been supposed from merely superficial, or even chemical examination.

W. M. C. O'Neill.

Dublin.

BOTANICAL NOTES FROM THE LINCOLNSHIRE COAST.

By H. Wallis Kew, F.E.S.

Only a very short description of the district in which these notes were made will be necessary. The country over which I collected consisted of about ten miles of coast, with the little Lincolnshire sea-side village of Mablethorpe as a centre. The sand-hills which bound the coast vary considerably; in some places they are narrow and high, with steep slopes of loose sand, while in other places they are very broad, and much covered with vegetation. When on these hills under the latter conditions, the observer might well imagine himself on a large inland common, for he may often walk long distances without seeing either the fields or the sea. At Mablethorpe the beach is sandy, and the tide comes nearly up to the sand-hills; at Saltfleet, however, a village a little farther northward, the low tides leave the sand-hills for a distance of five or six miles; here there are extensive mud-flats and salt-marshes.

Turning from the sea and looking inland, the Lincolnshire Wolds can just be seen in the far distance, and between these and the coast lie the marshes, formerly the home of many fast-disappearing forms, but now under a high state of cultivation. For a considerable distance from the sea there are no hedges, the fields being divided by slow-flowing drains.

Among the poppies the long-headed poppy (*Papaver argemone*) is plentiful in a sandy field just behind the sand-hills at Mablethorpe, and the opium poppy (*Papaver somniferum*) is not unfrequently found.

Several members of the Cruciferæ may be mentioned. The bitter-cress (*Cardamine hirsuta*), and the vernal whitlow-grass (*Erophila vulgaris*), are very plentiful on and near the sand-hills in spring, and are represented by their seed-pods in early summer. The horse-radish (*Cochlearia armoracia*), which is in full flower in June, is common on some parts of the hills, while the sea-rocket (*Cakile maritima*) grows more or less abundantly on the loose sand on both sides of the hills.

The sea-purslane (*Arenaria peploides*) is abundant in one or two spots, but is not generally distributed in the district. The stork's bill (*Erodium cicutarium*), which sometimes produces white flowers as well as pink ones, is abundant on the sand-hills and on the sandy places by the sides of road which runs along the landward foot of the hills, and the crane's-bill (*Geranium molle*) is one of the most abundant flowers on the hills. On the sand-hills also are numerous cushions of the biting stone-crop, or wall-pepper (*Sedum acre*), so familiar on old garden walls, the flowers of which appear towards the end of June, and are very showy.

Of the large order Umbelliferæ, one species may be mentioned, viz. the wild celery (*Apium graveolens*), at once recognised by its smell. It is common by the sides of the drains and in moist places near the sea.

The common ragwort (*Senecio Jacobæa*) is very abundant, and, as might be imagined, brings with it in large numbers the larvæ of the cinnabar moth (*Euchelia Jacobæa*). When I visited Mablethorpe in June, this insect was in the imago state, and very plentiful. I also found their pale-yellow eggs on the under-sides of the lower leaves of the ragwort.

The yellow bedstraw (*Galium verum*) is extremely abundant on the sand-hills, and in summer, when it is in flower, *Lagria hirta* and the pretty *Agelastica halensis* swarm upon it.

The salt-marshes at Saltfleet, which have been before mentioned, are literally covered with the thrift (*Armeria vulgaris*), and it is no exaggeration to say that from a distance acres upon acres of the marsh look as though they had been flooded with pink paint. In these salt-marshes *Hydrobia ulvæ* and other estuarine shells abound.

The sea milk-wort or black salt-wort (*Glaux maritima*), an exceptional member of the Primulaceæ, is growing in great plenty on the higher parts of the saltmarsh at Saltfleet, and is also to be found by the sides of the basin (the outlet of a large drain), at Mablethorpe.

Of the order Boragineæ, two species are conspicuous, namely, the bugloss (*Anchusa arvensis*), and the hound's-tongue (*Cynoglossum officinale*). The bugloss is common in a sandy field near the coast not far from Mablethorpe, together with *Papaver argemone*, while the pretty dull red-purple flowers of the hound's-tongue may be seen on all sides as you walk along the sand-hills, and are certainly more welcome than the ripe fruit which make it their duty to adhere to the clothes of every rambler on the sand-hills in autumn.

The sea-bindweed (*Convolvulus soldanella*), grows plentifully, particularly where there is loose sand; the sea-plantain (*Plantago maritima*), is frequently come across, but is not nearly so plentiful as the buck's-horn plantain (*Plantago coronopus*).

I found a single plant of the mother-wort (*Leonurus cardiaca*) some years ago, on the sandy bank by the side of the road, which runs parallel with the coast, but cannot find it now.

There are large "beds" of marsh-samphire or glasswort (*Salicornia herbacea*), near the saltmarsh at Saltfleet. When I stayed at Mablethorpe in June, this plant was just making its appearance all over the mud-flats; but when I visited the locality in August, 1885, it was in flower, and people were gathering it. It is sold in Lincolnshire as "samphire." The salt-root (*Salsola kali*) grows on the loose sand on the seaward side of the hills at Mablethorpe. I took specimens of it, in flower, in August 1885.

We now arrive at the typical plant of this coast, the shining silvery sallow-thorn or sea-buckthorn (*Hippophaë rhamnoides*). This shrub is extremely plentiful where the hills are broad, and less so where the hills are narrow and the sand loose, where its place is to some extent supplied by the marram-grass (*Ammophila arundinacea*), and other strong grasses. Both the Hippophaë and Ammophila are of great use in binding the sand together. On the top-most sprays of the sallow-thorn bushes perch large numbers of those beautiful birds, the whin-chats and stone-chats. Of shrubs, after the sallow-thorn, the elder grows nearest the sea, then comes blackthorn, bramble, and willow. On a willow on the sand-hill I found numerous specimens of the weevil (*Cryptorhynchus lapathi*), and noticed that they were piercing the young branches. I also observed *Cneorhinus geminatus* (which together with *Otiorhynchus ovatus*, literally swarm on the sand-hills) eating the leaves of willow.

The marsh orchis (*Orchis latifolia*), was growing plentifully in a moist meadow near the coast, with the spotted orchis (*Orchis maculata*), and the green-winged orchis (*Orchis morio*). The *Orchis pyramidalis* is plentiful on the sand-hills.

The yellow-flag (*Iris pseud-acorus*) and *Ranunculus sceleratus* were abundant in the marsh drains, as also were many other water-loving plants.

The asparagus (*Asparagus officinalis*) occurs on the sand-hills, but is not very common. A fine plant in full flower was found on the 9th of June. In August, 1885, I noticed it in fruit (then still green). The sea-arrow-grass (*Triglochin maritimum*) is common in a marshy place in a field just behind the sand-hills at Huttoft, not far from Mablethorpe. The cotton-grass (*Eriophorum polystachion*) was found in a certain ditch at Mablethorpe.

The box-thorn or tea shrub (*Lycium barbarum*), grows plentifully on the sand-hills near the "pull-over" at Mablethorpe, but must have escaped from some cottage garden.

Louth, Lincolnshire.

SOME CURIOUS REMARKS ON THE HISTORY OF TOADS.

THESE brief remarks have been borrowed from the "Natural History of Selborne," a work written by Gilbert White, M.A., who lived in the last century. Selborne, in Hampshire, is especially beloved by naturalists.

There have been many instances of toads being tamed. Mr. Arscott mentions one which lived upwards of thirty-five years. Not the least wonderful part of the history of the toad, is the circumstance of its being frequently found alive in the heart of solid rocks, and internal cavities of trees. In 1777, Herissant undertook some experiments to ascertain the truth of what has been related on this point. He shut up three toads in sealed boxes in plaster, and they were deposited in the Academy of Sciences. At the end of eighteen months, the boxes were opened, and one of these toads was dead, but the other two were still living.

It was contended that the air must have come to these animals, through some imperceptible hole, which escaped the notice of the observer.

Professor Buckland has made some experiments on this subject, with the following results:—

Two blocks of stone were taken, one of porous oolite limestone, and one of a compact silicious sandstone; twelve cells, five inches wide and six inches deep, were cut in the sandstone, and twelve others, five inches wide and twelve inches deep, in the limestone.

In November, 1825, one live toad was placed in each of the twenty-four cells, its weight being previously ascertained with care. A glass plate was placed over each cell as a cover, with a circular slate above to protect it; and the two blocks of stone, with the immured toads, were buried in Dr. Buckland's garden under three feet of earth. They were uncovered after the lapse of a year, in December 1826.

All the toads in the small cells of compact sandstone were dead, and their bodies so much decayed as to prove that they had been dead for some months. The greater number of the toads in the larger cells of porous limestone were alive; but they were all a good deal emaciated, except two, which had increased in weight.

Dr. Buckland thinks they had both been nourished by insects, which had got into the one cell, through a crack found in the glass cover, and into the other, probably by some small aperture in the tubing, which had escaped observation.

Dr. Buckland came to the conclusion, that probably all rocks or other substances, which enclosed toads, must contain some apertures by which air and food could be obtained by the prisoner. Now, on the other hand, a gentleman named Mr. Jessie informed Mr. Gilbert White, that he knew a gentleman who put a toad into a small flower-pot, and secured it, so that no insect could penetrate it, and then buried it so deep in his garden that it was secured against the influence of frost. At the end of twenty years he took it up, and found the toad increased in bulk, and healthy.

HAYGARTH ADDISON, L.R.C.P.

SCIENCE DIRECTORY.

Liverpool Astronomical Society. President, Rev. T. E. Espin, B.A., F.R.A.S.; Vice-Presidents, W. S. Franks, F.R.A.S.; W. F. Denning, F.R.A.S.; J. E. Gore, F.R.A.S., M.R.I.A.; James Gill. Secretary and Treasurer, W. H. Davies, F.R.A.S., 42 Irvine Street, Liverpool.

SCIENCE-GOSSIP.

AT the recently held annual meeting of the British Medical Association at Brighton, the most important scientifically attractive feature was the exhibition of cultivations of micro-organisms, by Dr. E. M. Crookshank, and Dr. F. G. Penrose. Dr. Crookshank also showed a large series of microscopical preparations of bacteria and other pathogenetic organisms.

WE have received the reprint of a very thoughtful paper in "The Garner" entitled "Plant Superstitions," by Mr. W. E. Bowers.

THE American Association for the Advancement of Science (based on the lines of the British) commenced at Buffalo, on August 18th.

THE last supplement to "Buchanan's Monthly Register" is devoted to a description of "Kapok," the Malay term for *Eriodendron aufractuosum* and *Gossam pinus alba*—a new "raw material," which possesses more silkiness than ordinary cotton.

THE lakes in the Aral-Caspian depression have been gradually drying up for the last century. In the last issue of the St. Petersburg Geographical Society there is a full statement of the facts.

PROFESSOR ROCKWOOD, an American physicist, states that seventy-one shocks of earthquake occurred in North and South America during 1885.

We regret to record the death of Dr. J. Mann, formerly a contributor to this journal, and well known as a meteorologist and writer on astronomy. Dr. Mann died at the age of 69.

The British Association begins its meeting at Birmingham on the 1st of September, under the presidency of Sir Wm. Dawson, principal of McGill College, Montreal.

M. Chevreul, the distinguished French physicist and authority on colour, attained his hundredth year on Monday, August 16th.

We much regret to have to record the death of a young and promising naturalist and geologist, Mr. Gerrard Kinahan, son of Mr. G. H. Kinahan, of the Irish Geological Survey. Mr. Gerrard Kinahan died from a wound with a poisoned arrow in a fight with the African native tribes at Anyappa, whilst engaged in exploration.

The Grosvenor Museum for Chester and North Wales was opened on August 12th by the Duke of Westminister.

MICROSCOPY.

Wilks' Cells, &c.—I should feel much obliged if either you or one of your correspondents would tell me how to use the "Wilks' Cell." I procured some a few months since, as they seemed from all accounts exactly to meet a want which I (and I should think many) have long felt. I should be very glad too to be told where I could find an account of the anatomy of *Dyticus marginalis*. I have sometimes ventured to think that it would add to the interest and value of your widely-read magazine if you could be induced to give us some "Studies of Common Animals" which would help the physiological student in the dissection of insects and small animals, in the same way that the excellent "Studies of Common Plants" help the botanical student.—*R. S. P.*

Dendritic Spots on Paper.—With regard to the dendritic spots on note-paper mentioned by H. Muller in your July issue, in the "Journal of the Chemical Society" for 1872, Professor Liversidge describes some experiments he made with them, and also their origin. He says the ash yielded by the spots when tested with the blowpipe tinges the flame with green. If they are moistened with hydrochloric acid, they produce the blue due to cupric chloride. With the borax lead, the reactions are also those of copper, viz., green when hot, and blue when cooled. If several spots are treated with a strong ammonia solution, the liquid becomes blue. Thus we see that they contain copper. Also it seems to be in combination with sulphur, for if a spot be placed on a bright surface of silver, and moistened with hydrochloric acid, a dark stain is produced. The spots are soluble in a solution of ammonia, giving it a blue tinge. Most paper contains sulphuric acid in combination; thus the sulphur in the spots cannot be made out by dissolving them in nitric acid, and then testing for sulphuric acid. The markings usually pass through the paper, and are then developed on both sides, though very seldom equally. In the centre of the marking one may usually devise a nucleus, which, when rolled with a hard smooth body, becomes more or less burnished. Thus we see that the spot is not a vegetable structure. The particle of metal in the middle seems to have been detached from the paper-making or finishing machinery, and having combined with sulphur in the paper, and perhaps with oxygen also; and being subjected to damp, the metal is held in solution, and when it dries the metal crystalises out. They are generally supposed to be black oxide of manganese, but they evidently are not.—*Werindes.*

Studies in Microscopical Science.—We are glad to welcome the first four parts of vol. 4 of this important and excellent work. They deal as follows —"Studies in Vegetable Physiology" (as illustrated by the Vegetable Cell), "The Mammalian Testis," "Normal Kidney," and "The Sea-fans." The work is continued on exactly the same lines as heretofore, and the coloured illustrations are equal to any of their predecessors in careful drawing and artistic finish. The slides accompanying each part are in Mr. Cole's best style of mounting.

BOTANY.

Dianthus Armeria and Prolifer.—I have been led by Mr. Arnold's remarks (p. 45) as to the scarcity of *D. armeria* in the previous two seasons, to look for it this year. It occurs on several gravelly banks not far from my house, which is about three miles from Racton, the place quoted by him, and I find it about as plentiful as heretofore. Perhaps the season may affect its appearance in different years. Last year I found in Hayling Island a little patch of *D. prolifer* of remarkably vigorous habit, being a foot or upwards in height; and this summer, on searching further, I have detected it in several other parts of the common (South Hayling), but much more dwarf, perhaps an average height of six inches. This plant is, I believe, much more local than the former.—*William Jeffery.*

The London Catalogue.—Mr. John Hanson has raised a most interesting and important question as to the London Catalogue. It seems to be neither more nor less than this: Is this publication to be

relied upon? The difficulty is how to answer it. As the only flora of the Bath District in print is one by Professor Babington, published in 1834, I began one two years ago, and made use of the seventh edition of the London Catalogue, in order to save my labour. Now that the eighth edition has made its appearance, I find that my labour has been all but lost, and that I must do my work over again. The editor of the eighth edition gives very sound reason for the publication of the new edition. What I complain of is, not the new classification, but the alteration of names which have become familiar, and for which there seems to me to be no sufficient reason. I should like to know, in cases where the doctors differ, to which doctor he has deferred. I have used Professor Babington's Flora, and, on the whole, prefer it to Hooker's "Students' Flora." I cannot help thinking that the editor of the London Catalogue inclines to Hooker. What I should like to know is in whom implicit reliance is to be placed? Human nature is fallible. Why should that part of the human family which includes the savants in botanical learning be expected to be exempt from the common infirmity? I hope Mr. Hanson's suggestions will be carried out, and that some eminent botanists will favour their humbler brethren, through the medium of your columns, with their opinions upon the eighth edition of the London Catalogue. I am inclined to think that the new edition is all it purports to be, but I leave it to those who are more competent to judge to give authoritative opinions.—*W. G. Wheatcroft.*

Abnormal Form of Plants.—In August of 1884 I found, and have still in my collection, an abnormal form of *Stachys sylvatica.* It has all the blooms of each whorl on peduncles about three quarters of an inch in length. The plant averaged four flowers in each whorl, and in one whorl two of the blooms produced other blooms on peduncles more than a quarter of an inch in length, one growing from the centre of the other, somewhat after the fashion of the hose in *hose primula.* The whole plant was about eighteen inches in height, with leaves cordate, acutely crenate, green, with a reddish-brown edge. In the same year I also found an abnormal form of *Melilotus officinalis,* which had, instead of the yellow racemes of flowers, unshapely masses of green growth. It looked at first sight like a strange Chenopod instead of a leguminous plant.—*John Taylor.*

Crepis Setosa in Wilts.—I observed, a few days ago, a considerable quantity of *Crepis setosa* in a field close to this town. It is, I believe, generally considered to be introduced with foreign seed, but I am not aware that it has been noticed in this county before. Besides the hairiness and bristles, the whole plant is of a peculiar pale green which distinguishes it from *Crepis virens.*—*W. A. Clarke.*

Alien Plants at Chiswick.—An interesting case, illustrating the introduction of aliens into our flora, has just come under my notice. There is a garden in Bedford Park, which was formerly solely used for the rearing of poultry, and consequently did not support any sort of vegetation. Last March, however, the occupiers and their poultry left, and the garden has since remained empty, except that in the interval a profusion of weeds have sprung up, for the most part *Chenopodium bonus-henricus* and *C. album,* with *Brassica sinapis* (*S. arvensis*), *Polygonum convolvulus, P. lapathifolium, Galeopsis tetrahit,* and *Cannabis sativa.* Mixed with these I found several plants which were new to me, and certainly not indigenous to the neighbourhood; these I took to Kew, where Mr. J. G. Baker very kindly named them for me, as follows:—*Panicum mileaceum, P. crus-galli, Setaria viridis, Alyssum incanum, Saponaria vaccaria, Fagopyrum esculentum,* and *Stachys annua.* Besides these, I have also found three other casuals growing in Bedford Park, *Potentilla recta, Impatiens parviflora,* and *Salvia verticillata.*—*T. D. A. Cockerell, Bedford Park.*

Botanical Monstrosities.—The first abnormal specimen that attracted my attention was *Anemone nemorosa,* which had its sepals transformed into leaves with a white streak up their centre. Of this, I found four or five specimens on different plants and in several situations. Having noticed the above, I had a very strong desire to find other monstrosities, and the following will best indicate the success which attended my searches:—*Primula vulgaris,* with four petals, about twenty specimens. *Primula vulgaris,* with ten petals, one huge specimen. *Ranunculus repens,* a flower completely metamorphosed into leaves, even to its stamens and carpels, which existed as scales in their usual position, inside the leafy petals. *Caltha palustris,** with the usual five sepals, and also an extra one upon the peduncle, about an inch below the calyx. *Saxifraga granulata,* a forward step in the direction of a double, as most of the stamens were converted into petals. *Centaurea cyanus,* this plant had four fasciated stems, each of which was about an inch wide; it was growing in a particularly barren position, behind a gate-post at the entrance of a drive. Will some of your readers who see the above, kindly write us their experiences, as I am somewhat curious to know if others have seen likewise?—*Edwin E. Turner, Caggeshall, Essex.*

Bellis Perennis.—Mr. Swinton's experience with the daisies on the downs is similar to what we find on the moors here. On the millstone grit no daisies grow, and all the vegetation is rough and strong—brackens, ling, bilberry, &c.; but on the limestone moraines we find a fine short wiry grass,

* A friend of mine called my attention to a tulip in his garden which had the same curious arrangement as the above, *i.e.,* an extra sepal lower down the stem.

with diminutive short-stemmed daisies, which are certainly perennial, for we can find them at all times. On the exposed and bleak moor-top we occasionally meet with holly or hawthorn bushes growing in small hollows. From a little distance these bushes look like patches of moss, for they do not rise above the surface of the surrounding moor. They grow perhaps a foot in height, and three or four feet in diameter, quite filling the hollow in which they have found a shelter, and their leaves and branches are so close that we may step on them quite firmly.—*H. Snowden Ward, Ilkley.*

GEOLOGY, &c.

Glacial Action near Grasmere.—If any geologist adopts Mr. Pearce's valuable recommendation to examine the moraines of Easdale, let him by no means miss those in the upper parts of Langdale and Borrowdale, which are more striking.—*William West, Bradford.*

Glacial Action near Grasmere.—In reference to a note (p. 189) by Mr. Horace Pearce, I may say that I have frequently observed and studied the moraine heaps of the Lake District. There are many such in the upper part of Ennerdale, around Greenside reservoir, in Greenup valley, and all over the summit of the Stake Pass, &c. Their appearance is often very impressive, peopling the solitude as it were, and imparting thereto a most weird-like aspect. We are told that they were deposited by glaciers descending the mountain-ravines; but we think that this ice-origin is not by any means clear or correctly assigned. Their substance is very compact, being formed of earth and pieces of rock rough and rounded. The ground between them is soft and boggy, and frequently traversed by streamlets. We opine that the uppermost or highest summit of these moraines represents the height of the original valley; and the earth and rubbish between them has been swept away by wild, wintry, tempestuous floods sweeping tumultuously from the mountains in their windward rear. Hailstones and pieces of solid ice may have aided in the disruption; but the idea of a glacier descending and carving its way along these intermediate spaces seems highly absurd and untenable. Moreover we have frequently noted that the top of the moraine corresponds exactly in height with the water-swept exposure of the hill-walls around, so that it is extremely probable that the agency which caused the one phenomenon occasioned also the other.—*P. Quin Kegan, LL.D.*

For Mounting Chalk Organisms.—Take some of the soft chalk from the hollows on the exterior of flints, and which, when damp is of the consistency of putty; place it in a large tube and shake well; repeat the washing until all milkiness has disappeared. Take a small quantity and dry it, then put it into a test tube, with sufficient turpentine to rather more than cover it, and boil to expel the air and evaporate the bulk of the turpentine. When the turpentine has almost disappeared, drop in some pure Canada balsam, and heat it for some time to evaporate the turpentine. The balsam with its contained organisms can then be taken out of the tube and placed upon a slide or covering-glass, and heated still more, to harden the balsam, taking care not to boil it, and when sufficiently hard mounted and finished at once. —*C. Upton.*

To Mount Coccoliths from Chalk.—Take a small quantity of whiting, and shake up in a test tube with about twice its bulk of water, and allow it to settle. Immediately the heavy portion has settled, pour off the apparently clear water which will be found to contain most of the coccoliths. Some of this water should then be taken up into a rather fine pointed pipette, and the upper end plugged and stood point downwards upon a clean cover glass upon which should be placed a drop of rain or distilled water. The coccoliths will subside into the drop of water which can then be evaporated, and the coccoliths mounted in pure balsam. Very little but coccoliths will be found upon the slide.—*C. Upton.*

NOTES AND QUERIES.

Bird Sounds.—In reply to C. C. S. I beg to say the landrail or corncrake often makes a very peculiar hoarse grating kind of noise in the evening. As regards the other noise, Markwick says: "I have frequently shot a bird which haunts the tops of trees and makes a sibilous noise, but it always proved to be the common willow-wren or chiff-chaff; but I can scarcely think this is the bird to which C. C. S. refers. The note of the yellow-hammer is a singular prolonged sibilant note, and it may be that. There is a bird that makes a noise not unlike the sharpening of a saw; I have heard it in woods; can you tell me its name?"

N.B. An exhaustive paper on the different notes of birds at different periods would be a boon to naturalists.—*Mark Antony.*

Preparing Lettuce-leaves.—How can I prepare the leaf of the lettuce to show the caliciferous vessels as figured in Thomé's "Botany"?—*W. W.*

Variety of Herring-gull.—I should like to have full particulars of the bird mentioned last month, as I should be glad to publish a description of it (or any other variety) in my "British Birds."—*S. L. Mosley, Beaumont Park Museum, Huddersfield.*

Spots on Sycamore Leaves.—The black spots on sycamore leaves, about which W. B. Drummond inquires at p. 167, are a fungus *Rhytisma acerinum*; there is a similar parasite, *R. salicinum*, on leaves of some willows.—*H. W. Lett, M.A.*

PAPILIO MACHAON.—All entomologists will read with pleasure the capital papers by Mr. Finch, but surely he makes a mistake in saying of the larvæ of *P. Machaon* that "they cannot be reared away from their marshy home." I have bred several of this fine insect, and have obtained, with ordinary care, good results both as to quantity and quality of the imagos. It is not necessary to supply them with either *Peucedanum palustre* or *Heracleum sphondylium*, but in captivity they feed freely on the leaves of the carrot and thrive on them.—*L. Surrage.*

DORMOUSE AND HONEYSUCKLE.—Often have I ployed "Bo peep" with "Mus Avellanarius" round the bole of a sugared tree, but never till the other day, and that a hot one, did I know that the sun was no obstacle to him in his pursuit after sweets. Seeing my daughter beckoning my attention to a fine honeysuckle bush in our garden, I approached warily, and saw a very fine specimen of the above running up and down every stem that bore the pretty red trumpet-shaped buds, and busily nibbling away the nectar-hiding tips thereof. Not in the least timid, he allowed me to approach and watch his *modus operandi*. Seizing in succession each trumpet bud near to its point of attachment, and pulling it down, it passed it through his little jaws till the tip was reached, which he bit away, and, with black eyes sparkling with pleasure, regaled himself on the nectar. It was a pretty sight, and, in another sense, so was my honeysuckle an hour or so afterwards. My visions as to takes of bright-winged "Sphingidæ" were over. "Porcellus" and "Elpenor" would only turn up the proboscis at my despoiled and rifled "Lonicera." "Convolvuli" (by-the-bye I had one off it this time last year, and he did hum with his wings while hovering) would have said "Not for Joe." I might easily have shaken the dear little thief into a butterfly net, but . . . well ! he was too much of a darling, (*loquente filia*). — *Windsor Hambrough, Crookham, Farnham.*

TWIN TREES.—The twin trees near Leominster mentioned by Mr. Howarth Ashton in the July number of the SCIENCE-GOSSIP must, I think, be very similar to a double tree at Eridge, a village about 2½ miles from Tunbridge Wells; in this case the trees are an oak and a beech, which have evidently grown up side by side from their earliest infancy. The stems grow together as one trunk, and it is not until the difference in the texture of the barks is noticed that one sees that there are really two stems; they grow together for five or six feet, and then separate. The oak is considerably the smaller of the two. A rough idea of the section of this tree may be formed by drawing a circle the size of half-a-crown, and another the size of a shilling, the centre of which is on the circumference of the other, then rub out the segments of the circles which are between the points where the circles cut one another. I do not think that there is any interchange or flow of sap from one tree to the other. There is another curious tree in this neighbourhood, in Frant Churchyard. A fine, but ancient oak tree, has a birch tree growing out of it. In this case the birch seed has evidently germinated where a branch of the oak had been broken off eight or nine feet from the ground. The birch is now some six or eight inches in diameter. The oak is partly decayed internally, so that the roots of the birch reach the ground inside the tree.—*G. S. S., Tunbridge Wells.*

A QUEER FISH.—Some little time ago, coming across a fish with a very singular modification of, or appendage to the organ of sight, I made mental note to seek some account of it. That which roused my curiosity is briefly this—The side of the head of the fish was covered by a glassy layer, extending, if my memory serves me, from near the lips in front to near the edge of the gill covers behind, and from near the vertex of the head to and along the inferior lateral border of the head below. The glassy layer passed smoothly unbroken over the orbit and its contents, which were near the centre of the layer. With the cook's huge knife I dissected it from the side of the head, and showed it to be in shape, and fashioning a roughly oval meniscus with sharp edges, thickening towards the margin of the orbit, where, at its thickest, it was about a quarter of an inch thick. At the margin of the orbit it was sharply excavated, and a nearly hemispherical hollow formed in its deeper (under) surface. At the time of examination I took this transparent laurella to be the cornea, and the excavation to be the anterior chamber recessed in the cornea for the spherical lens which lay beneath in the orbit when I had removed the laurella. I had no time to make anything but a hurried examination, and made sure of finding an account of this, to me, new and singular modification of the cornea. Günther, "The Study of Fishes," p. 113, says, "In all fishes the general integument passes over the eye and becomes transparent where it enters the orbit; sometimes it simply passes over the orbit, sometimes it forms a circular fold." That the integument, in a restricted sense, passes over the eye of all higher animals, as the anterior transparent epithelium of the cornea I knew, but I was not prepared to meet with such a development and extension of this layer as occurs in this fish, extending as it does, enormously thickened far beyond the limits of the orbit. In this fish then, the cornea is convex and not flat, and exceeds in superfices the sclerotic many times, for the globus and orbit were not large. The eye can be gifted with little if any movement, for the cornea is not free to move, and hence, the eye is probably without extrinsic muscles and with aborted motor oculi nerve.—*J. W. P.*

SPOTS ON SYCAMORE LEAVES.—Your correspondent (J. Muir, p. 179) is mistaken in thinking that the black spots on the leaves of the plane-tree are caused by "drops of rain or dew acting as sun-burners by condensing the solar rays." It is a fungus, and a very common one—*Rhytisma acerinum*, Fr. (Maple, Rhytisma)—also named *Melasmia acerina*, Lev. & B. & Br. A stage of it by some botanists has been called *Xyloma acerina*. There are six British species in the genus, one of which, *R. salicenum*, is common on some willows. I have seen it plentiful on both *Salix ripens* and *Salix nigricans*.—*Andrew Brotherston, Kelso.*

SINCE writing above note, I see on p. 190, Hilderic Friend has no doubt that the spots are due to *Capnodium Footii*, which is not very likely. But if your correspondent would kindly send a specimen to Mr. W. G. Smith, Dunstable, or Dr. Plowright, Kings Lynn, or any other cryptogamic botanist, it would be easily settled.—*A. B.*

BIRD SOUNDS.—In reply to the query from C. C. S., in the July number of SCIENCE-GOSSIP, I should say that the birds whose notes he hears are the yellow-hammer and the night-jar respectively. One cannot be certain, however, from the meagre description given.—*W. Finch, jun., Nottingham.*

TOADS AND FROGS.—The note by F. G. S. is very interesting, and well worth recording. I see that the writer mentions that his toad moistened its

mouth by dipping its feet in the bath. This is not more remarkable, I think, than the fact that all frogs and toads are in the habit of cleansing their food by means of repeated rubbing or wiping with the fore-feet. I have often watched them with a large and very dirty worm, and they are always very careful not to swallow any dirt. When, by some mischance, a particle of soil has entered the mouth, I have seen them disgorge the portion of the worm swallowed, and cleanse the mouth before proceeding to feed again. Has F. G. S. ever noticed how the toes of a toad will frequently twitch violently after a very full meal? This is a curious thing, which I have noticed repeatedly; the toes twitch and jerk so violently sometimes, as to spring the foot from the ground, much to the toad's discomfiture. Give a toad a very lively insect, too, and watch the poor fellow scratch his stomach, after swallowing the same; one can scarcely witness a more ludicrous sight.—*W. Finch, jun., Nottingham.*

Tenacity of Life in Moths.—The experience recorded by G. F. Harding, in Science-Gossip for July, is not at all remarkable; to an entomologist it is a common occurrence. Many female moths are hard to kill. I have had them tear themselves in half in their endeavours to get off from the setting-board, living after this mutilation, and laying their eggs. Once the eggs are laid, it seems to be an easy matter to kill the insect; indeed, it frequently dies immediately on the consummation of this its life's object.—*W. Finch, jun., Nottingham.*

Cats and Rabbits.—This reputed crossing between these animals seems a strange thing, and despite the Rev. Brenan's remarks thereon, I cannot think that such a crossing could possibly come about, the animals being so opposite in every way. To my mind it certainly could not have occurred between a cat and wild rabbit, as inferred by a former note in Science-Gossip. The only chance for such union would be between animals brought up together from infancy, and then I very much doubt if such union would result in progeny. I think it more likely to be a freak of nature in the first instance, and that the curious formation of limbs has reproduced itself in the descendants.—*W. Finch, jun., Nottingham.*

Limnea Stagnalis.—This pond snail is undoubtedly omnivorous, and has no objection to anything of animal nature, dead or alive, that may come in its way. It used to attack successfully even the lively stickleback in my aquarium, several of which suffered death and destruction from it. It eagerly devoured any dead fish it found.—*Henry Ullyett, Folkestone.*

Solanum Dulcamara.—In reply to the query of the Rev. R. S. Pattrick, I can assure him of the poisonous nature of this nightshade. One of my younger pupils some years ago ate of its bright berries, and it was scarcely thought he would recover. He had to be held down in bed, and the eyes were dilated, just as in belladonna poisoning. In fact, the physician treated him for that, and successfully, though I knew the belladonna did not grow in the neighbourhood. The boy showed me the berries afterwards, and where he had gathered them.—*Henry Ullyett, Folkestone.*

Migratory Birds and their Old Haunts.—I think there is not much doubt that some, if not all, of our migratory birds, do revisit their old haunts year after year. During the time that I have been here, this being the fourth summer, a pair of nightingales have been regular visitants to my garden, building either in the garden, near to the house, or in a small shrubbery close by. The female I cannot be certain about, but the male has, I am sure, been the same bird each year, for we recognise certain peculiarities of its song. I believe that if different birds of passage could be marked in some way, most of them would be found to return to the same spots each succeeding season. The treble call of the cuckoo, referred to by Mr. F. C. Taylor, is not an uncommon note of the bird, for I often hear them utter that call, and I think it is generally when the bird is on the wing, very often being repeated four or five times in rapid succession, as though the bird were startled.—*J. H. Allchin, Sutton Valence, Kent.*

Birds and Yew Berries.—A yew tree in a garden adjoining mine is visited in the autumn and early winter by swarms of thrushes, blackbirds, finches of various kinds, and other birds, who feed voraciously on its berries, without apparently suffering any inconvenience therefrom. Speaking of berries leads me to ask if any of your readers noticed the late ripening of the ivy berries this year. As a rule, I think they are generally ripe about the beginning of April, in time for the advent of certain migratory birds, such as the black-cap, who is ravenously fond of them, and appears to make its first meals off them on its arrival in this country. But this year I noticed that the berries were not ripe until quite the middle of May, when they were not only poor in quality, but few in numbers, so that the thrushes, blackbirds, and black-caps did not obtain such a feast from them as usual.—*J. H. Allchin, Sutton Valence, Kent.*

Rat's Teeth.—I had brought to me, a short time ago, a rat with the upper incisors curved and grown to the length of $1\frac{1}{2}$ inch.—*L. Lee, Naturalist, Nottingham.*

Delhi Elastic Stone.—In our last issue, at page 191, Mr. C. E. Paterson, asks information regarding this stone. The Cyclopædia of India describes it as a micaceous sandstone, so full of mica as to render the sandstone flexible. It is known to the people as the Sang-i-larzan, *i.e.*, the shaking-stone, and is obtained from the Kalyana, in the Nargana Dadri, in Jheend, also in Ulwar, and at Jubbulpur. It is of a reddish yellow colour, and is used for roofing and for ornamental purposes. The small specimen in his possession "about nine and a half inches by two and a half inches in width, and half an inch in thickness," are curio samples which the miners sell to earn a little, and are to be seen in all the museums in India.

Ahrus Precatorius.—In our issue of the first of August, Mr. Whitmore Wells mentions that "the root of this plant is poisonous, and has often been used by the convicts in Mauritius, both by rubbing it on their eyes and chewing it to induce illness." In India the root is officinal, and used in all the hospitals, European and native, as a substitute for the glycyrrhiza liquorice plant.

A Post-glacial Forest in Hull.—Writing to a Hull paper on Tuesday a correspondent says:—I beg to advise you of an interesting discovery in the new tertiary of the Hull Valley, connected with the former wooded condition of England and with neolithic man. On the western outskirts of Hull, about a mile from the Humber and one and-a-half miles from the River Hull, they are working a brickyard in the old marine warp. The tides have not flown over this district in historic times, the river banks being put down as Roman. On cutting through the clean warp clay, 12

or 13 feet, they have come across a forest bed on the irregular surface of the drift, the surface of which is a greenish sandy clay, with pebbles and stones. About one foot below they find eight feet of red clay, with pebble stones, fragments of chalk, &c. ; below this quicksand, not very thick, possibly only an erratic layer. The boulder clay should appear here, but where it rises above the sea-level it is invariably covered with drift. The roots of the trees are standing where they grew. They are of very large size, and, from their closeness, represent a dense forest. They are oak and Scotch fir—mostly the latter. On the surface of the drift is a peat bed from two to four feet in thickness, largely composed of trunks, and fallen branches of the trees. The prostrate oaks are fairly sound, and dark brown in colour. The Scotch firs are mostly decayed. A friend of mine has bought the trees, and is cutting them in boards and planks. He has one Scotch fir sound, of which I have a specimen. It is blue in colour, and smells strongly of turpentine and sulphur. The growth of the wood has been quick, and I can count 65 annual rings. This tree shows that the climate has not changed, for its growth is identical with the Scotch fir of to-day. The growth of the oak does not look any different to that of living trees in this latitude. A rubbed or polished stone axe, or celt, has been found on the surface of the drift, at the bottom at the peat, but it had been obtained and carried away by a clergyman before I got to know about it. The celt was four inches long, of green coloured stone, smooth surface. Nuts have been found, probably from an undergrowth of hazel. This forest bed is now at the low-water level of the sea.

OLD ENGLISH PLANT-NAMES.—In the list of old English plant-names which I read in SCIENCE-GOSSIP, I wondered at finding herb-twopence made synonymous with loosestrife. The name loosestrife seemed to have been used by our ancestors in a manner so loose as that it would be likely to engender strife. As to the plant called by such a name, in Lee's Introduction to Botany, I read of it as applied to plants of four different genera, Lysimachia, Epilobium, Lythrum, and Gaura, the last being distinguished as yellow Virginian Loosestrife, a plant which I confess I do not know, though I learn from Sweet's "Hortus Britannicus" that a species of gaura was introduced in 1762, but it is not described as yellow, nor do I think it likely to be the plant to which Lee refers. *Gaura mutabilis* described by Sweet as having been introduced in 1795, is most likely to have been Lee's Virginian Loosestrife. The British wild flowers commonly called loosestrife I am tolerably familiar with, and am sure that none of them was ever called herb-twopence unless by mistake. The mistake seems to have arisen from the fact that *Lysimachia vulgaris* is the common yellow loosestrife, and *Lysimachia nummularia* is herb-twopence or moneywort, the meaning of which names is apparent in the pair of opposite leaves making one think of penny pieces as they lie on the ground by reason of the prostrate habit of the plant which distinguishes it completely from all those which are ever called loosestrife, however loose the names may be applied. —*John Gibbs.*

SPOTS ON SYCAMORE LEAVES.—If Messrs. Drummond and Muir will examine in spring the dead leaves of the sycamore which may be gathered under the trees, whose leaves they have found to be spotted with black, they will find that the spots have become thickened, and that examination with a microscopic power of 250 diameters will reveal the presence of ascospores and paraphyses, showing that the black spots represent the incipient stage of the fungus, *Rhytisma ascerinum.*—*Wm. West, Bradford.*

FUNGUS IN WATER.—I have observed the matted mycelium of what I take to be a state of *Aspergillus glaucus* scores and scores of times, in all kinds of infusions and preparations, which do not contain a sufficient quantity of alcohol to properly preserve them. Mr. Brenan's description agrees exactly with what I have observed in "closely corked bottles." I have seen it produce Aspergillus, but have also seen similar mycelial masses produce such species.—*Wm. West, Bradford.*

BITTERSWEET BERRIES.—If Mr. Lett refers to former numbers of SCIENCE-GOSSIP, or to "Taylor on Poisons," he will find that there is conflicting evidence as to the poisonous properties of these fruits.—*Wm. West, Bradford.*

SYCAMORE.—There is one point respecting the sycamore seed which Mr. Malan in his interesting observations on Sycamore Samarus (p. 180), does not allude to; in fact, his remark that in November "there is no life visible—no promise" would lead one to suppose he has not noticed it. I refer to the fact that the cotyledons are fully as green while yet wrapped up in the husk with the lining of hair (*simarre*) and a thin inner skin as after they had unfolded and started into growth. This would tend to indicate the presence of chlorophyl in the absence of light. Have any other readers of SCIENCE-GOSSIP noticed this?—*William Jeffery.*

SPOTS ON SYCAMORE LEAVES.—In the July number of SCIENCE-GOSSIP Mr. Drummond asks the cause of the spots on sycamore leaves. In the last number one correspondent suggests that they arise from the sun's rays being condensed by drops of rain or dew, and another, that they are due to a fungus, *Capnodium footii.* Of course, without seeing the leaves it is impossible to speak with certainty, but if they are similar to the spots on the leaf enclosed, which abounds on most sycamores, they are caused by the spermoza of a fungus, *Rhytisma acerina* (Cook's Handbook, Brit. Fungi, p. 756). If kept slightly moist the ascigerous state will be developed in the spring. It is quite distinct from capridium.—*T. W. Roper.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

W. SHEPHERD.—Your specimen is the common liverwort (*Marchantia polymorpha*), and the mushroom-like objects are the fructifying parts.

J. J. CORNE.—You cannot do better than get Huxley's "Physiology," published by Macmillan at 4*s.* 6*d.*

W. T.—Your fungus is the meadow champignon (*Marasmius oreades*).

D. Packer.—Please write to Mr. John Browning, F.R.A.S., 63 Strand, London. He will doubtless give you all information you require for the construction of a Dyalite telescope.

C. F. C.—Kircaldy is on the lower coal measures, and the strata are full of fossil plants. We hardly think your fossil will be a sea-weed; it is much more likely to be a fragment of some carboniferous land plant, such as a flattened calamite.

W. Duncan.—The material which goes by the name of "Russ" among fishermen is the remains of a fine-tubed sea-worm, *Filograna implexa.* The polyzoon on shell of Modiolus is *Lepralia coccinea.*

C. E. Gubbins.—Miss Agnes Catlow's "Popular Conchology" (secondhand about 3*s*.). Sowerby's "British Conchology," published by Lovell Reeve at 10*s*. 6*d*.; may get a secondhand copy of W. Wesley, scientific bookseller, 28 Essex Street, Strand, for much less.

W. Hambrough.—We received a box-lid with the post-office remark "found without contents," which, from the handwriting, we suspect must have belonged to your box.

EXCHANGES.

Offered, liberal exchanges of Cape shells for specimens of marine and freshwater shells from all parts of the world. Also Cape bird skins in exchange for skins of birds or mammals from all other parts of the world.—Mary Glanville, Curator, Albany Museum, Grahamstown, South Africa.

Wanted, half-plate photographic instrument; liberal exchange, seaweeds, ferns, etc., mounted in Canada balsam for microscope and magic lantern slides; ditto as herbarium specimens; choice unmounted material, mostly marine; hardy Alpine plants and rare herbaceous, etc.; stove, greenhouse, and other plants and ferns, etc.—T. McGann, Belharbour, co. Clare.

Exchange Butler's "Evolution Old and New," 7*s*. 6*d*.; Bastian's "Evolution, and the Origin of Life," 6*s*. 6*d*.; "Thoughts on Recent Scientific Conclusions, and their Relation to Religion," 5*s*. (all in splendid condition), for ornamental foreign shells, curiosities of natural history, or what offers? no micro slides wanted.—John Inglis, 12 Glen Street, Lauriston, Edinburgh.

Wanted, anatomical sections, ready mounted, human and animal, stained and injected; also insects. Give in exchange well-mounted diatoms.—John Langstaff, Caldmore, Walsall, Staffordshire.

Eggs, side-blown, one hole, not clutches, to exchange for others not in collection: moorhen, redstart, chiffchaff, lesser whitethroat, whitethroat, swallows, bullfinches, chaffinches, linnets, greenfinches, garden warblers, tomtit, willow wrens, robins, yellowhammers.—George F. Lund, Marlborough House, Sidcup, Kent.

Named Crustacea, shells, minerals, etc., offered for stone or bone implements, English or foreign.—Edward Lovett, West Burton House, Croydon.

Offered, one-holed clutches of sparrow hawk, long-eared owl, dipper nest, stonechat nests, sedge warbler, corn bunting, magpie, nightjar, swift, ringed plover, kittiwake, herring gull; eggs of gold crest, rock pipit, hooded crow, heron, guillemot, razor-bill, gannet, storm petrel. Wanted, good clutches. State offers and all desiderata.—R. J. Ussher, Cappagh, Lismore.

For exchange, "Knowledge," "Annals of Natural History," and "Midland Naturalist," for April to August.—T. F. Uttley, 17 Brazennose Street, Manchester.

What offer for Woodward's "Manual of Mollusca" and "Scientific Recreations?" Wanted, geological works; also Eocene fossils.—George E. East, jun., 10 Basinghall Street, London, E.C.

Wanted, fresh Pilularia and Isoetes in fruit; also Jevon's "Logic," Balfour Stewart's "Physics," Valentine's "Practical Chemistry," and Remsen's "Organic Chemistry," in exchange for good micro slides.—W. West, Bradford.

Wanted, live sea anemones, sea urchins, serpula, and other objects for a marine aquarium, in exchange for micro slides.—H. Parritt, 103 Camden Street, London, N.W.

Wanted, West of Ireland mosses and Hepaticæ; Scotch, Alpine, and other species in exchange.—Wm. Smith, Ormiston Lodge, Arbroath, N.B.

For "Practical Dictionary of Mechanics" (Cassell), 3 vols., A to Z, 7395 figures, half-bound calf, wanted Lyell's "Principles," 1876, with Günther's "Study of Fishes" or Darwin's "Variation," 1885, or other books.—B. Hobson, Tapton Elms, Sheffield.

Wanted, Cassell's "Familiar Wild Birds" and "Wild Flowers," Science-Gossip vols., "English Illustrated Magazine" (any vols.), "Cricket," vols. i. and ii.; must be good condition; bound or unbound.—A. Davis, jun., High Street, Great Marlow.

Wanted, British birds' eggs; also foreign stamps; good exchange given.—A. Davis, jun., High Street, Great Marlow.

Wanted, good specimens of micro fungi in quantity, such as *Chætomium elatum, Erysiphe tortilis, Uncinula adunca, Peronospora infestans, Phyllactinia guttata,* etc., in exchange for micro slides.—Racine, 15 Horton Lane, Bradford.

For leaves of *Hippophae rhamnoides* (hairs, fine polariser) or leaves of *Deutzia scabra*, send stamped addressed envelope to—W. White, 17 York Street, Nottingham.

Good mounts of whole insects or selected and arranged Diatomaceæ offered in exchange for male cockchafers (*Melolonthæ vulgaris*), field crickets, etc., also wings of *Urania rhypeus* (Madagascar), insects fresh caught, not dried cabinet specimens.—W. White, 17 York Street, Nottingham.

Wanted, named bones and teeth from the Norfolk forest bed; will give *ad valorem* in coal fossils or micro slides.—C. F. Cross, Werneth Hall Road, Oldham.

Offers requested for a few duplicate eggs of black-headed gull, guillemot, kittiwake, and common skua from Iceland and Faroe Isles.—F. Fenn, 20 Woodstock Road, Bedford Park, Chiswick, W.

Swiss land and freshwater shells offered in exchange for British species.—Dr. Rudolf Haeusler, 128 Kensington Park Road, London, W.

Several dozen well-mounted slides, mostly polariscopic, to exchange for other good slides or books. List on application.—J. W. T., 22 North Road, Bristol.

Having a large collection of animal hairs, I can offer about forty varieties in exchange for good unmounted objects or six slides.—A. Harvey Williams, Hythe.

Kirby's "European Butterflies and Moths," new, bound, for exchange. Wanted, Cooke's "Handbook of British Fungi" and "Rust, Smut, Mildew, and Mould," or many other good works. State offers to—Arthur Downes, Combe Raleigh, Honiton, Devon.

Wanted, clutches of eggs of dunlin; and clutches with nest of pied flycatcher, creeper, wryneck, coal tit, marsh tit, hawfinch, siskin, goldfinch, and woodlark. Good exchange in kind.—G. F. W. Lees, care Dr. Lees, Lion House, Hawes, R. S. O., Yorks.

What offers for splendid large micro, having mechanical stage, coarse and fine rackwork adjustment, 1, ½, and ¼-inch objectives, polariscope, etc., in mahogany cabinet?—R. Tomlin, 36 High Street, Gosport, Hants.

Diatoms, *Coscinodiscus radiatus* (selected), etc. Wanted, Heliopelta (selected) or gathering containing it, or other large forms.—G. H. Bryan, Thornlea, Cambridge.

A collection of about 250 Ceylon birds, in good order, to exchange for a 10 in. × 12 in. camera—photographic—and tripod.—Dr. Clements, Station Hospital, Shorncliffe.

British mosses: a large number for exchange. What offers in microscopy?—J. Harbord Lewis, 145 Windsor Street, Liverpool.

Offered, some vols. of Jardine's "Naturalist's Library," Montagu's "Dictionary of British Birds," and other books. Wanted, John's "British Birds in their Haunts" (recent edition), vol. ii. of Cassell's (Duncan's) "Natural History."—J. H. K., 18 Church Street, Commercial Street, E.

Will exchange unbound numbers of "Chemist and Druggist" for 1880, or ditto of "Pharmaceutical Journal" for 1879, for "Ponds and Ditches" or "British Fungi," or back numbers of Science-Gossip or well-mounted slides.—H. W. Case, Cotham, Bristol.

Unio Margaritifer, H. virgata, P. vortex, and *Bythinia tentaculata*; will exchange for any of the following butterflies: Machaon, Rhamni, Edusa, Cratægi, Sinapis, Galathea, Semele, Sybilla, Iris, Polychloros, *C. album*, any of the Fritillaries, Hairstreaks, or Blues, excepting Alexis.—T. A. Lofthouse, 67 Grange Road, Middlesbrough.

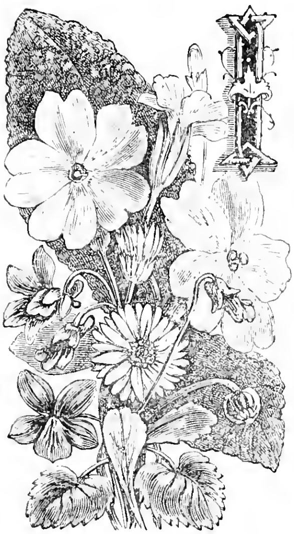
BOOKS, ETC., RECEIVED.

"Studies in Microscopical Science," parts 1, 2, 3, 4. vol. iv., by A. C. Cole.—"Bulletin of the U. S. Geological Survey," Nos. 24, 25, and 26.—"Proceedings of Liverpool Naturalists' Field Club, 1885–86."—"Transactions of Penzance Natural History and Antiquarian Society, 1885–86."—"The Asclepiad."—"Proceedings of American Academy."—"The Amateur Photographer."—"The Camera."—"The Scientific Enquirer."—"The Hoosier Naturalist."—"The Garner."—"The Naturalist."—"The Botanical Gazette."—"Journal of the New York Microscopical Society."—"Science."—"Journal of Conchology."—"Journal of Trenton Nat. Hist. Soc."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

Communications received up to the 12th ult. from: H. W. P.—F. K.—L. D.—H. C.—W. S.—Dr. C.—C. L.—J. H. L.—H. W. K.—C. E. G.—Dr. J. W. W.—M. C. C.—Dr. R. H.—E. H. B.—A. B.—E. L.—E. B.—R. J. U.—L. L.—T. F. U.—W. F.—V. V.—H. S. W.—J. H. A.—R. J. C.—F. F.—G. H. B.—J. S. W.—R. T.—J. T.—G. F. W. L.—W. A. C.—A. D.—T. D. A. C.—J. A.—A. H. W.—H. W. L.—J. N. D.—G. E. E., jun.—F. W. R.—W. J.—A. H.—M. A.—J. G.—W. G. W.—E. M. C.—W. W.—Dr. P. Q. K.—W. P. H.—J. W. T.—C. F. C.—W. A. H.—W. M. W.—B. H.—A. D.—H. P.—W. S.—E. E. T.—A. C. C.—E. A.—G. S. S.—E. A. S.—H. W. B.—J. W. P.—T. M. G.—J. L.—F. W. H.—J. J.—H. W. L.—J. R. M.—M. G.—W. B. C.—G. F. L.—J. E. G.—W. H.—J. S.—D. P.—H. W. S. W.—F. B.—W. B. G.—J. H. K.—H. W. C.—C. U.—W. K. M.—&c.

THE TWO MIRRORS.

By W. J. N.



I WISH to help some of the younger microscopical readers of Science-Gossip to make a more intelligent, and therefore more successful, use of the mirrors for the purposes of illumination.

Illumination is to every microscopist a subject of special interest. Its importance is so great as to be quickly recognized, even by the young observer. Its difficulties are as quickly felt. Yet it is, perhaps, seldom studied with sufficient care and thoroughness, owing, it may be, to a fear that the investigation would prove both difficult and tedious; that it would, in fact, require more time, and a larger amount of mathematical knowledge, than the young microscopist has at command.

But if the principles which underlie the art of illumination be not understood, it naturally follows that the art itself will remain unmastered, and that the practical details will be the occasion of more or less perplexity. Difficulties will be unexpectedly met with, which the observer, failing to account for, cannot with any certainty overcome. The results of his most careful efforts will frequently be imperfect. A good result, if obtained at all, will be obtained rather by accident, than as the result of intelligent design. The light is then sufficient in quantity, without being in excess; is cool and soft in quality, and admirably helpful of the powers of the object-glass. The favourite slide receives a new dower of beauty. The eye detects in it new delicacies of detail, and, after a prolonged observation, experiences no fatigue. But when, next evening, the object is to be exhib'ted to a friend, under identical conditions of illumination, how different the result! The light is red and hot; or, its glare is blinding; or, it is dim, and cannot be made agreeably brilliant. The object-glass works feebly. Details appear indistinct—confused. The eyes smart and water under a strange feeling of strain. What the error may be, the novice does not know. He moves the mirror. The lamp and bull's-eye are tried in new positions. But all ends, as it began, in comparative failure. Any microscopist who consults his memory, will be likely to recollect some annoying incident of this kind.

Illumination as a whole, is a large subject; but many of its special difficulties will be found to cluster round a comparatively small part of it—namely, the employment of reflected light; the agent of reflection being usually one of two mirrors attached to the microscope. I propose to take these mirrors as a text, but with liberty reserved to wander a little away from and around it as occasion may require, yet always within reasonable limits.

At the outset, something must be assumed. I suppose the reader to be the happy possessor of a fairly good instrument, fitted with such simple accessories as a diaphragm, and a spot-lens; and that he has a suitable lamp. The microscope will have two mirrors; one plane, the other concave. These mirrors will possess certain powers of adjustment. They may be turned aside, right or left, from the central position, and may be placed at any desired distance from an object on the stage between the limits of about two inches and four and a half inches.

It is quite likely that the young microscopist has no clear ideas as to the need there is for so considerable a range of adjustment; nor as to the conditions under which it would be desirable to place the concave mirror at some one of the possible distances, say, for instance, at two inches and four-fifths. It may be that he could not state what is the distance between the centre of his concave mirror and its principal focus; nor even explain the meaning of that expression. In such a case, an intelligent use of the concave mirror is not to be supposed possible.

To begin then at the beginning; we must acquaint ourselves with some of the properties of plane and concave mirrors. We must enquire what is meant by angles of incidence and reflection, by the "principal axis," and "principal focus" of the concave mirror, and by "conjugate foci:" must enquire, further, why it is that the "principal focus" is the best, and yet cannot be employed by the microscopist; and what are the many and strange alterations made in the positions of the secondary foci, when we exchange a "pencil" of parallel rays for one of divergent rays, or of convergent ones;—or, again, as we merely alter the angle of incidence of any one of these forms of pencil; or, as we vary the distance between the lamp and the mirror, or between the lamp and the bull's-eye.

We may further enquire as to reasons of preference for any particular kind of "pencil," and for any particular angle of incidence; and must learn how to form accurately such a pencil, how to assign the correct positions of conjugate foci, and how exactly to obtain any selected angles of incidence. Some other hints as to the management of lamp and bull's-eye, and as to a stand for the instrument, together with a few short tables of results, and one of simple rules and reminders, may be thrown in, as we pass along, or be added by way of conclusion.

(*To be continued.*)

THE RECENT EARTHQUAKES.

AT the recent meeting of the British Association, Mr. W. Topley, F.G.S., supplied some notes on the recent earthquake in the United States, in the compilation of which he had been assisted by a telegraphic despatch from Major Powell, Director of the United States Geological Survey. Mr. Topley observed that during the last ten days there had been earthquake disturbances over a very wide area of the earth's surface. On the night of Friday, August 27, there were shocks all over Greece, and in a smaller degree all over the East Mediterranean area. This earthquake wave apparently travelled from east to west. It was first felt in Malta, Calabria, and Naples, and thence it travelled eastwards as far as Alexandria. It did not appear to have been felt west of Southern Italy, probably because its westward area of propagation was there beneath the sea. Possibly it was only a coincidence, but if so a very curious one, that the earliest important earthquake disturbances in the United States should have occurred on Thursday, the 26th, and Friday, the 27th. There had been slight premonitory shocks for two or three days before, but the principal shock was that of Tuesday night, August 31. This had, however, been succeeded by shocks, fortunately of less intensity, which had been felt over a still wider area. As late as Sunday night there were shocks at Charleston. The main shock was felt from the southern part of the New England States on the north-east to the western shores of Lake Michigan on the north-west. In the west it was recorded from St. Louis and Memphis on the Mississippi, and from the coast of Florida in the south. Of the later shocks—and these had been very numerous—some were felt in Nevada and some in California. Examining the newspaper telegrams, Mr. Topley said it was probable that there was some error either in observation or in telegraphing as regarded the time at New York, Springfield, and Albany. New York was 420 miles from Raleigh, and the wave was stated to have travelled in three minutes. Albany and Springfield were respectively 330 and 520 miles away, and the wave travelled to each in ten minutes. An important point in Major Powell's despatch, however, was the evidence of the rapid transmission of the main earthquake wave. Major Powell stated that it travelled over the 900,000 square miles at from twenty-five to sixty-five miles per minute; but by comparing the times given in the telegram with the distances on a map, he (Mr. Topley) found that the velocity varied from 36 to 140 miles per minute. The shock originated in Central North Carolina on Tuesday, August 31, at 9.50 P.M., 75th meridian time, which is five hours in advance of Greenwich time. The time at Greenwich was therefore 2.50 A.M. on Wednesday. Although Charleston had experienced the maximum structural damage, this did not appear to have been the exact point of origin. The earliest shock was noted at Raleigh, 230 miles to the N.N.E.; here the time was 9.50. And if they took a scale of intensity, with five at Charleston as a maximum, Raleigh was four; Memphis (650 miles west), which the wave reached at 9.55, was also four; Pittsburg (330 miles N.N.W.), which the wave reached at 10 o'clock, was also four. The farthest points at which Major Powell recorded the scale of intensity were Milwaukie, three, at 10.6; and Cedar Keys in Florida, two, at 10.5. There did not seem to be any relation between the intensity and time and the surface distance from the area of origin. This last, indeed, they would not have expected to find. They would rather have looked for rapid transmission along certain lines or through certain rock masses. The last important earthquake of the Eastern United States, that of August 10, 1884, was carefully investigated by Professor Carvill Lewis. This was found to range along the eastern side of the Appallachian Mountains, nearly along the line where the old earth movements had been greatest. The exact age of the greatest movement there was well known. It was post-carboniferous, for the coal measures had been violently contorted and coal converted into anthracite as the effect of great thrusts from the south-east. It was pre-triassic, for the trias lay upon the contorted and denuded edges of the older rocks. But along the same line, and parallel with it, there had been

later earth movements. The triassic beds had been faulted and invaded by basaltic dykes in pre-cretaceous time, for upon their denuded edges the cretaceous rocks were laid down. It was along the northern part of this line that the previous earthquake occurred; it was near the southern part of this line that the recent earthquake had originated. The area most affected by the recent earthquake was a vast plain of tertiary and cretaceous rocks. The older rocks underlay these unconformably, but at unknown depths. It might, perhaps, be found that the transmission of the shock to distant points had depended in part upon the range on the harder and older rocks beneath, as was very evidently the case with the East Anglian earthquake. In this earthquake the great structural damage was confined to a small area; the distant points at which it was felt were, in most cases, upon or near to exposure of the palæozoic rocks, and Birmingham was one of these distant points. In other cases, earthquakes were known to be related to lines of fault.

The later telegram stated, that Mr. M'Gee had been sent by Major Powell to investigate the effects of the earthquake at Charleston, and that he found the local evidence, such as the direction of the fissures, contradictory and difficult of explanation. They need not wonder, therefore, at being yet unable to understand the wider question connected with its range and transmission. Passing to the local phenomena, Major Powell's telegram stated that the earthquake had been accompanied by landslides and crevasses, but by no sea-wave. Fissures opened in the ground, some of which ranged north and south, others east and west. From these fissures mud and sand were ejected. Several telegrams spoke of stones falling from the air, and although there was plainly much exaggeration in these accounts, it was probable that some stones were ejected far into the air, and subsequently fell to the ground. Later telegrams spoke of an unusually high tide, which did some damage over the low lands of which Sullivan's Island is composed, and there was probably some connection between this and the earthquake, as the tides were then the neap tides.

Accounts varied as to the direction in which the vibratory motion of the earth travelled near Charleston, but as was often the case near the earthquake centre, there was evidence of a twisting movement. One interesting point in connection with earthquakes was the influence they had on wells and springs, and in these respects the American earthquake had had important results. Water now stood where none occurred before, and in certain places springs had been dried. The strangest statement, however, on this point was that the Mayor of Bellaplain, Iowa, had telegraphed to Iowa for an engineer to change the course of two gigantic rivers, formed by a phenomenal water burst, which were running at the rate of twelve miles an hour, causing much destruction of property. In boring a 4-in. artesian well at a depth of 180 feet, the water had been forced several hundred feet into the air, and the stream had increased until it was sixteen inches in diameter, the upward force equalling that of dynamite. The natural gas wells of Pennsylvania had been affected, and at one town (south side Pittsburg) the factories had been left in darkness through the natural gas supply failing.

The most interesting fact, however, was that stated in the newspapers about the Excelsior Geyser in the Yellowstone, which had been quiet for four years, but which had spouted violently since Friday, August 27. Torrents of boiling water were thrown up three hundred feet into the air. The geyser was strongly affected long before the earthquake itself was apparent in the Western States, and when only slight premonitory shocks were apparent in the Eastern States.

In some telegrams which had been published, it was stated that Mr. M'Gee was inclined to regard the earthquake as due to the gigantic slidings of part of the earth's crust towards the sea, but that his detailed observations of the fissures near Charleston presented some difficulties in the way of this explanation. If such an exceptional explanation were the correct one, some important changes of level would be expected near the coast; but this had not been the case. It was too early yet to theorise on this side of the Atlantic, but at present the earthquake seemed best explained by referring it to some widely acting seismic disturbance, indications of which were previously given by the geysers and by premonitory earthquakes in South Carolina. It would probably be found, however, that its range and local intensity had been controlled by the distribution of the rock masses, or by old lines of earth movement and earth weakness.

THE CARBONIFEROUS LIMESTONE OF THE SOUTH WALES DISTRICT.

By W. H. Harris.

SITUATED about mid-channel between Cardiff and Weston-super-Mare are two islands, known as the Flat and Steep Holmes; they are both masses of carboniferous limestone, and their presence here may be taken as indisputable evidence of the original continuity in this direction of the now widely separated coalfields of Bristol and South Wales.

The steep holm is a wild rugged place, with wall-like cliffs ranging from 100 to 150 feet high. From these the turf-covered summit rises like a saddle-back for another 50 or 60 feet, so that there is comparatively little level ground to be found on the island. It extends east and west about half-a-mile, and the average width from north to south may be computed roughly at about 350 yards.

The island is strongly fortified, and has barrack accommodation for troops. There is a large squarely-built house known as the Steep Holm Hotel, at which the inner man may be cared for. To botanists this spot is sacred, as being the only part in Great Britain where the wild pæony finds its natural home. It flourishes in the interstices of the rocks, in positions which are practically inaccessible, unless more than ordinary risk be run to obtain a specimen.

Totally unfit for agricultural purposes, the island affords pasturage for a few sheep; the grass growing most luxuriantly here, even at times when the sister island is much impoverished in this respect. The conformation of the surface, however, makes the pursuit not entirely free from risk, as the animals are liable to stray to parts from whence they cannot be recovered, and should a strong gale arise, a not unfrequent occurrence, they most probably fall victims to their temerity.

The flat holm lies about two and a-half miles to the north of the steep holm, and for parochial purposes is considered a portion of St. Mary's parish, Cardiff.

As indicated by its name, it presents features quite distinct from its neighbour. In shape it is nearly circular, being about 700 yards from north to south, and from 500 to 600 yards from east to west. The beds of rock dip gently to the south-west, and on the western side, where they form a long shelving beach, they may be studied in detail for a considerable distance.

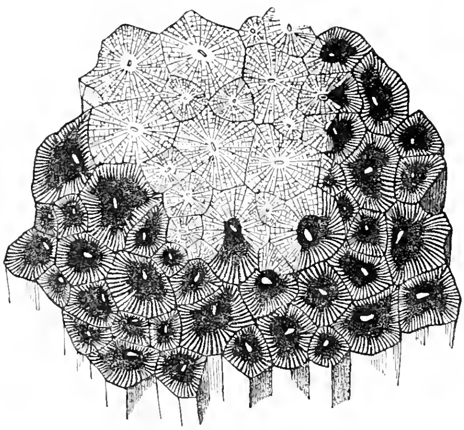


Fig. 134.—*Lithostrotion basaltiforme.*

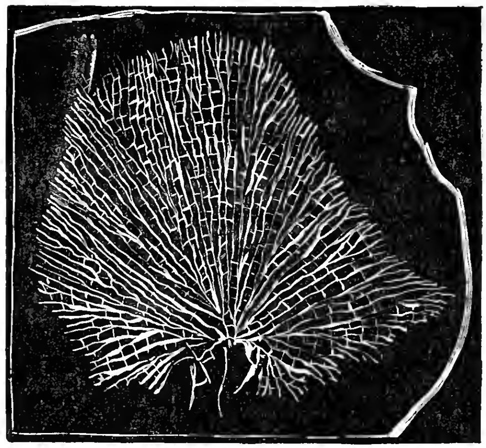


Fig. 135.—*Fenestella plebeia.*

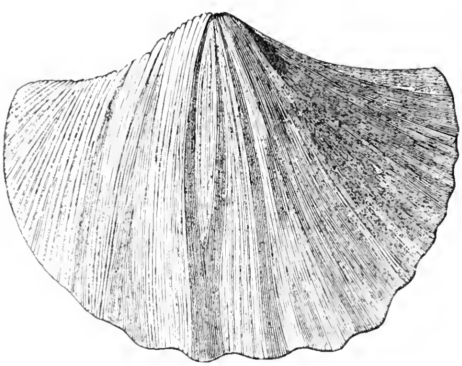


Fig. 136.—*Productus giganteus.*

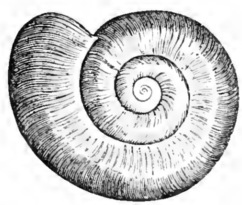


Fig. 137.—*Euomphalus pentangulatus.*

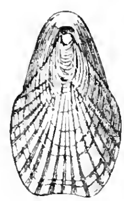


Fig. 138.—*Terebratula hastata.*

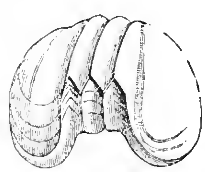


Fig. 139.—*Rhynchonella pleurodon.*

Characteristic Fossils of the Carboniferous Limestone. (From Taylor's "Common British Fossils.")

In the east, the island attains an altitude of about 150 feet; the soil is capable of cultivation to a limited extent; but the raising and fattening of stock and the production of vegetables are the chief industries pursued for the greater portion of the year. During the winter months fishing for sprats and cod is carried on at both islands; but of late years these have been comparative failures, probably owing to the large number of steam vessels frequenting these waters.

Like the steep holm, it is strongly fortified, and has a lighthouse fitted with a lantern having all the

latest improvements for showing an intermittent light.

Returning to the western side of the island before referred to, one of the most interesting examples of ripple marking meets the view it is possible to conceive; in fact, so prominently defined are the ridges, that it might be more correctly termed wave marks. For a space of about 20 yards square the surface of one bed is exposed, and the eye looks down upon what may not be inaptly termed a petrified sea. It requires no very great stretch of imagination to conceive the idea, that the waves had been turned into stone as they approached the coast in a west north-westerly direction, and that you were now looking down upon a palæozoic sea.

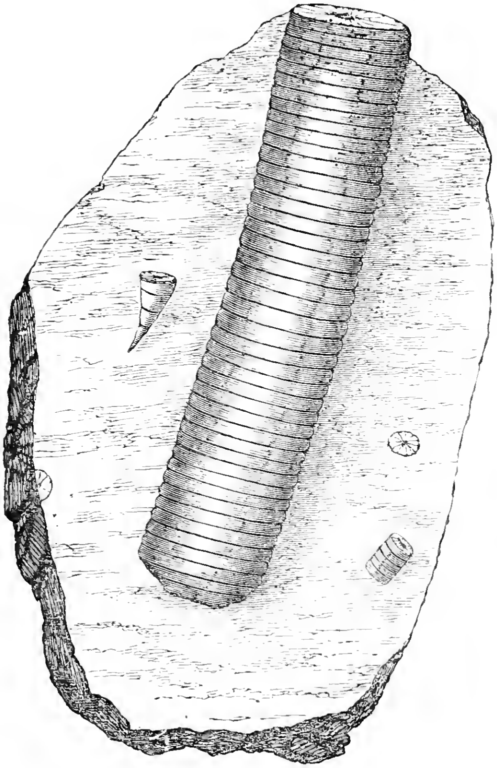


Fig. 140.—Stem of Encrinite.

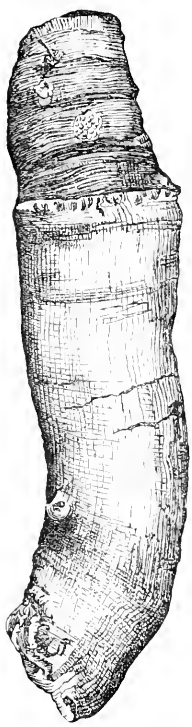


Fig. 141.—*Amplexus coralloides.*

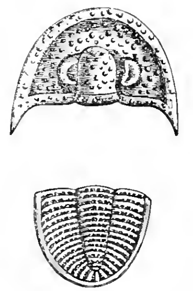


Fig. 142.—Head and tail of Trilobite (Phillipsia).

Fig. 143.—*Pleurotomaria carinata.*

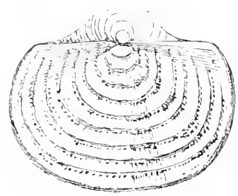


Fig. 144.—*Productus punctatus.*

Characteristic Fossils of the Carboniferous Limestone. (From Taylor's "Common British Fossils.")

The rock is a compact thickly-bedded sub-crystalline limestone, and when viewed microscopically has a granular appearance. It is almost, if not wholly, made up of organic remains, consisting of foraminifera, minute ossicles of encrinites, fragments of what appear like tests and spines of echinoderms, and small bodies resembling minute corals. All are fairly well preserved, but nevertheless exhibit to some extent the effects of attrition to which they have been subjected, as occupants of a plastic mass encountering the action of the waves in the manner indicated above.

It has been pretty generally accepted that compact and thickly bedded limestone indicate conditions of deep clear water at the time of deposition, and that the disturbance caused by shallow water was not favourable to its production, but of late there have not been wanting attempts to prove that these features were not strictly essential; the evidence furnished by this particular bed is therefore exceedingly valuable, as going to some distance to prove that a limestone of undoubtedly marine origin can be and has been formed in water sufficiently shallow to receive the impress of the waves as they rolled over the limey floor or beat upon an ancient coast.

The bed immediately succeeding the above described is also built up of similar organisms, but the frail forms of foraminifera are more plentifully distributed than before. Their presence appears to indicate that the water had become sufficiently deep to place the bottom out of the influence of the grinding power of the waves, and as they are examined the truth of Byron's line—

"The dust we tread upon was once alive!"

forces itself upon us. It points also to the subsidence

of the ocean's floor, for a large series of beds may be traced from this point to the southern side of the island, all of later birth than the starting-point.

Another bed in ascending order was doubtless originally composed of much the same class of organisms as the preceding; but careful inspection discloses a fact which is not without value. All the more delicate and fragile forms have disappeared, but here and there a more than usually robust one still retains its outline. The rock assumes a more distinctly crystalline texture. What is the meaning of this? Here is a minute fissure in the section; examine closely, and you look down upon a miniature river of calcite carrying with it microscopical grains of foreign material; here at a point it has met with some obstruction: the stream bifurcates and the branches given off are again sub-divided until they become quite indistinct. This tiny flood is doubtless the product of the dissolution of the organisms originally contained, and the practical result is the re-deposit and crystallisation in minute granules similar to the saccharoidal marbles.

Rutley says, "It seems impossible, in many cases, to say whether this structure in limestones has been due to metamorphism engendered by contact or proximity of eruptive rocks, or whether it is owing to other causes." * Here, then, is a certain amount of evidence that it has been possible to produce this change by the simple agency of water without calling in the assistance of the igneous element. Certainly no eruptive rocks occur within reasonable distance of this locality, and even had their influence operated, it would be still more difficult to account for their action on this particular bed, while other older, but not far removed, beds in vertical depth, escaped. It is evident a continuance of these conditions would have removed all trace of life from this bed, and shows it is unwise to doubt the organic origin of a bed, although there is no distinct proof obtainable.

Lyell, in his "Student's Elements of Geology," says, "In the upper part of the mountain limestone group in the south-west of England, near Bristol, limestones having a distinct oolitic structure alternate with shales." South Wales also furnishes evidence of certain beds having this structure; nor is it of local occurrence, but appears to have prevailed over a very large area. Both the holmes have beds which are distinctly oolitic to the unaided eye; but the microscope reveals the fact, the grains are not surrounded with the number of laminæ that specimens taken from other districts exhibit. The fragments are of larger size, have a rolled appearance, and the external deposit appears less pure than in other examples to be named.

At Rhiwbina, on the south crop, excellent examples of this structure occur. The enclosed fragment may consist of a minute foraminifer, a fragment of polyzoa, or portion of an ossicle of crinoid. All are surrounded by the concentric laminæ of minute crystals of calcite; the individual grains, however, are much smaller than those taken from the holmes.

The most perfect example of this structure, however, is met with in the north-east of the district in the neighbourhood of Gilwern. Here the nucleus appears as a mere speck, and as many as fifteen distinct laminæ surround it, the whole grain measuring about the one-fiftieth part of an inch. The interspaces are filled with crystals of much larger growth; the whole bed has almost a perfectly white appearance, and would furnish a building material of great beauty and durability.

Who shall venture to say what were the conditions which caused these differences to exist side by side? Were these granules quickly crystallised, their growth being arrested as they approached each other? or were they subject to disturbance and consequent movement among themselves, and thus the growth of encrusting crystals was interfered with, while the interspaces, being the last to consolidate, were sufficiently quiet to permit the crystals to assume much larger proportions?

One peculiarity worth recording as occurring at Rhiwbina should be stated. There is at this point a deposit of ironstone made up entirely of the altered ossicles of encrinites, polyzoa, and allied forms; it has the deep rich colour of hæmatite ore, and some years since was worked to a limited extent, but for some cause has been abandoned. It occurs at or near the base of the limestone, and in its way is most interesting.

Few rocks present more points of interest than the limestones, or are of greater value to mankind. If we view them as the preservers and repositories of the myriad forms of ancient life, they cannot fail to impress the mind with the idea of the immensity of time required for the accumulation of the vastly thick deposits of different ages. Their distribution in time and space is also interesting, as indicating a continuity of conditions through countless ages. In arts, manufactures, architecture, and agriculture, their uses are too well known to require recapitulation here, and the object of this paper will have been attained by placing on record one or two features of interest occurring at points in this locality not often visited by knights of the hammer.

Cardiff.

* "Study of Rocks," by F. Rutley, F.G.S., page 287. London: Longmans, Green and Co. 1879.

SYCAMORE COTYLEDONS.—Referring to Mr. Jeffery's query in last month's SCIENCE-GOSSIP (p. 215), regarding the colour of sycamore cotyledons, I beg to state that I gathered a number of samarus in the autumn, two years ago, and after keeping them all winter in the husks, found, on opening them, that the cotyledons were as green as when first taken from the trees.—*J. Ballantyne.*

THE WINGS OF BIRDS.

By J. Lancaster.

WHILE engaged in ascertaining the methods employed by the soaring birds, on reaching a point where light began to break upon the obscurity, it became evident that the flight of all birds would be made comprehensible; that not only the day-long translation of frigate-birds in circular paths high in the air, but the homeward passage of pigeons and the migratory flight of wild-fowl, would emerge from the realm of fancy and range themselves with allied phenomena on the platform of recognized mechanical activities.

Indeed, many specimens of active wing flight have hitherto as completely baffled the best efforts of mechanical science as has soaring flight. When the weight of the bird is considered as resistance to be overcome by muscular force, flapping is incompetent to do the work required, and in spite of such efforts gravity would compel motion in its own direction to the surface of the earth.

The area of the two wings of a duck of four pounds weight, which is effective on the air in the down stroke is not more than two square feet. Counting one up and one down vibration as a single stroke, not more than three of these would be made in one second, and a liberal estimate would be an average of one foot of space travelled at each stroke for the entire surfaces. This ignores loss in the upward vibration. The effective work done on the air would therefore be equal to that of two square feet of surface, moving at right angles to itself at the rate of three feet per second. Turning to Hutton's Tables, we find that a wind of about thirty feet per second is required to furnish a normal pressure of two pounds on a plane of one foot square, so that if the wings of the duck were supposed to be rigid, and the motion a continuous fall, uniformity would not be reached under a velocity of thirty feet per second. If this velocity be transferred to the wing vibration, stability of the body could only be secured by a rapidity of stroke ten times as great as what actually occurs. But when we add the air resistance to lateral motion of, say one hundred miles an hour, measured by air passing the bird, its muscular exertion becomes still more incompetent to effect the result, for now a portion of the energy which before was used to antagonise gravity must antagonise air resistance.

Further load is thus added to the working force, which before was hopelessly incompetent to its task. No method which is supposed to differ from the direct motion will assist in the least. It is velocity which is wanting. As there can be no shorter line between two points than a straight line, so there can be no more effective method than continuous motion, normal to the surface, with no change whatever in the character of the activities. No screw motion, or wave-motion or figure-eight-motion, which the wing may imitate, can produce results as good as the direct motion.

But bird flight, thus conceived, does not exist in nature. As a fact gravity is not resistance, but motive power. The bird is a machine doing work on air under the dominion of that force. The work done is not the sustained bird, but the quantity of air disturbance which falls to an equilibrium with surrounding atmosphere after the passage of the moving body through it. Gravity is not resisted, it is resolved. The bird is constantly moving in the direction of the normal component with a uniform velocity, which develops air-pressure sufficient to neutralize the component acting in the plane of the wings and the additional surface friction of the air. The direction of the fall is that of the gravity of the bird's mass, and this direction changes with the slant of the wings, being always at right angles thereto in obedience to the law of fluid pressures. The fall is always away from the plane of the wings, or the bird's horizon, so that no weight is lifted in the lateral motion, as the body is continually descending on its own vertical. This view completely transforms the aspect of atmospheric navigation, and brings order out of chaos.

I have hitherto spoken of the expansion of the compressed air in the rear of the wings producing the thrust needed for the lateral motion. This was done to avoid complicating the case. The significant thing is the resolution of gravity and consequent shifting of the vertical, and if this fact is seen the method of utilising the pressures presents no difficulty.

I now wish to direct attention to the structure of a bird's wing. The wing of a pigeon or any of the barnyard fowls may be examined, as the peculiarities I desire to point out are found in all of the large birds. First, let us examine a feather. If we place one on the table with the lower surface upwards, and pass the hand from the quill to the tip, it will seem smooth to the touch, while reverse motion meets with much roughness, which increases as the pressure of the finger becomes greater. If a small tube be taken into the mouth and the breath blown quite slanting towards the tip, the feather will remain smooth, and the air slip over it easily. In the reverse direction the blast will tend to open the ribs and increase the roughness. The feather is a little like a cat's back; a rub toward the rear is pleasant to all parties, while one the other way tends to cause motion of the animal to the front. Notice also that the tip is very thin and elastic, yielding in a graceful curve to slight pressure. The surface of the wing is composed mainly of these feathers, having their general direction across, with the tips to the rear. They are held by the integument covering the bones of the wing, which are located on the front edge, and while on the upper front side the curve is smooth and regularly rounded, beneath there is a projection downwards of the skin

which forms a ledge reaching along the humerus to the elbow, and thence to the junction of the ulna and radius with the bones of the wrist, being greatest at the elbow. In the soaring birds this ledge is largely developed, projecting downwards in the frigate birds one and a-half inches at the elbow, tapering to the wrist and body. This ledge, at the front edge of the wing, seems at first view to be an obstruction to flight, as it makes considerable thickness where the surface first meets the air, but, as we shall presently see, has an important function to perform as a member of the organised mechanism of flight. The curves in the plane of the wing need not be considered as they are not concerned with flight, and when the bird is in the act of flying they are straightened out so that the wing assumes a plane shape. The above four peculiarities we desire to note. Firstly, that the wing is practically a thin plane. Secondly, that its rear edge is very pliable and elastic. Thirdly, that its under-surface is rough to motion from rear to front, but smooth to motion from front to rear. Fourthly, that it is supplied with a ledge along its under-surface at the front.

(*To be continued.*)

STUDIES ON COMMON PLANTS.

No. VI.—The Musk (*Mimulus*).

By E. A. Swan, B.A.

This is a very good example of the persistence of a type with such amount of variation as may from time to time be beneficial, such variation, however, being confined within certain well-defined limits, the expression here not being used in the strict Darwinian sense. In saying this, I have in view more especially the rhizome, or underground creeping stem, which, as can be seen by reference to Fig. 145, is characterised by great versatility; thus, if roots are expedient, it throws out roots abundantly at the nodes; if branch stems, then let there be branch stems; if both, then both are produced. Moreover, the end of the stem generally withers, and this is probably due to its having sufficiently sapped the earth in that quarter, and rendered any further expenditure there unnecessary. But sometimes branch stems, as well as the main stem, rise above-ground, and these are often supported by aerial roots from the first node. Again, there are rudimentary buds below ground, and real buds and leaves above ground, while in place of the roots at the nodes, we have all over the stem, above ground, fine hairs; we have too the flowers. The development and growth below keep pace with the development and growth above. A good floral display being required for the purposes of reproduction, the underground mining operations are carried on in different directions to secure the constant demand for sap. In the figure it will be noticed that one branch stem rises upwards, while its mate from the same node humbly prefers to carry on root work; this admirably illustrates the unanimity that exists between all parts of the plant to contribute, in one way or another, useful assistance and to avoid waste. The influences that induce these two branch stems to act as they do, may be difficult to guess, for, at the first glance, there appears to be no tangible reason why they should not both act alike. But a solution of the problem may be found in the assumption, that the particular direction of any stem depends, in the first place, on the richness or comparative richness of the soil at any one spot; and where, from its position, one branch stem has the advantage over another, that other may elect to grow upwards. True this is only a guess, but in considering the subject, the law of necessity which plays such an important part in vegetable life, must not be lost sight of. That law, in its working, tends to preserve the

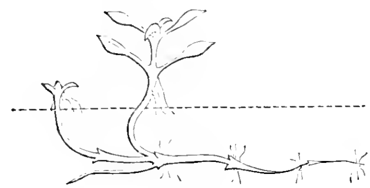


Fig. 145.

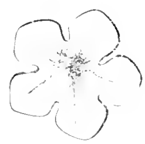


Fig. 146.

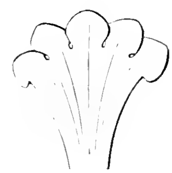


Fig. 147.

balance between supply and demand, and it is always exercising its power, not only on the whole plant generally, but on each cell and each minute part particularly, so that a branch stem in its inception, is subject to and governed by it. If one stem, from the accident of its position or from other causes, devotes itself to collecting sap, another stem less favoured, must direct its attention to an equally necessary task, viz. carbon producing, and for that purpose seek the light. They each grow necessarily in the direction where they will be of most service, and where they can most readily obtain supplies. By a kind of natural selection, one stem, from its inherent strength or character, or from its location, being most fitted to collect sap, leaves nothing in that way for the other, which must therefore wither and die, or search for a fresh sphere of usefulness.

I will now devote a short space to the consideration of the flower. Passing from the calyx, upon which I make no comment, I take the monopetalous five-lobed corolla; looked at from above, it presents the shape

shown in Fig. 146; its position is generally inclined towards the horizontal, the three most prominent lobes being undermost, and standing out as they do beyond the others, they form a convenient platform for insects to settle upon before entering the storehouse. The lobes are spread out, except at night-time when they slightly close over; the rest of the corolla consists of a narrow tube tapering towards the base. The stigma, which with its style, fits closely against the upper part of the corolla and reaches that part where the two less prominent lobes begin to spread out, is in two flat angular pieces, the lower one hanging down and opening wider as an insect rubs against it, when entering the tube, and closing as it withdraws. The four stamens start from the base of the corolla, are attached to it for a short distance, and then bend round and upwards, so as to bring the filaments close to the style. The various lengths of the important parts measured from the base are approximately as follows:—

Corolla to extremity of lowest lobe	$\frac{14}{16}'$
Stamens	$\frac{6}{16}'$
Pistil	$\frac{8}{16}'$
Tube at longest part	about $\frac{11}{16}'$
Tube at shortest part	about $\frac{5}{16}'$

This leaves about an eighth of an inch from filaments to stigma. From the base of the centre, i.e. the lowest or most prominent lobe to the base of the corolla, there runs a straight groove formed by a ridge caused by the bending of the flower on either side, and there are also two other side grooves, each bounded on the outside by a less defined ridge; the side grooves are curved. Down the centre of each groove is a dark line nearly to the base; there are also several other dark lines running towards the base on the ungrooved parts of the corolla, but these are all slightly curved. The two centre ridges have a few dark yellowish spots on them, and all the ridges are covered for a short distance from the opening with fine hairs, inclined outwards, the two middle ones being very plentifully covered so as to form a downy coat. Fig. 147 is the corolla laid open and showing the dark lines. I take it they serve as sign posts to guide insects to the nectar; for, alighting on a flower, they are attracted by them and induced to carry their explorations further inwards. The object of the fine downy hairs is, I conceive, to regulate the size of the opening and the entrance to tube, so as to fit insects of different sizes and ensure the upper parts of their heads or bodies rubbing the stigma. Thus, a small insect would be borne up and against the stigma, while a larger insect would press the hairs down and thus secure a wider opening. By this means a greater variety of fertilising agents would be made available. The centre groove too, gives an insect room to work its proboscis forward without altering its general elevation, and the side grooves may receive its feet. Then again, the distance between filaments and stigma, about one-eighth of an inch, allows plenty of space for security against self-fertilization. The insect on first entering, rubs against the stigma and passes on and presses against the pollen bags, from which some of the pollen adheres to its head or body; in retiring, it closes the stigma, so that no pollen can rest on its surface; proceeding to another flower it there in entering, deposits pollen on the open stigma, thus securing a cross, if not on a flower of a different plant, at any rate on a different flower of the same plant.

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

Earthquake Prospects of London.—The brown pall of mysterious cloud-matter that so suddenly buried the whole of London and its suburbs in dreadful darkness on the morning of September 4, produced something approaching to a mild panic among many. The newspapers of the day before were crowded with details of the Charleston earthquake, and allusions to its possible connection with that of Greece, besides some speculations suggesting further extensions of general subterranean disturbance. The idea that we are in the midst of a general earthquake epoch seems to have gone abroad, and gloomy warnings in the sky are expected by some, but unfortunately for those who dwell in earthquake-stricken regions, no such warning precedes the disasters.

The inhabitants of London and its suburbs have unquestionably more to fear from an earthquake, if it should reach them, than those of any other city in Europe. Of all ordinary buildings, not specially constructed for earthquake resistance, those which have the thickest walls, and are constructed of the biggest blocks of stone, have proved to be the most capable of surviving severe shocks. London is a city of tall houses built of little bricks. The older houses have walls 14 to 24 inches thick, made of fairly good bricks, held together with honest mortar. The modern "genteel villas" and "family mansions" of the suburbs, to which the snug citizen retires after business hours, in order to breathe the country air and exhalations of the family sewer, are usually built of rotten bricks, (faced, of course) resting loosely on crumbling mortar made of a little lime mixed with dust-hole refuse instead of sand. The walls thus built being but 9 inches thick, and held upright by feeble joists and rafters, cannot bear the least displacement, without a downcrash of the whole fabric. A tremor that would barely disturb the inhabitants of Tokio, will kill half a million of Londoners.

Fortunately for the metropolis of the world, it is built on a thick deposit of clay or gravel. These, especially the latter, have little elasticity suitable for the transmission of earth tremors. The Japanese,

who have specially studied the subject, and raised seismology to the rank of a special science, find that the best protection for their houses is to rest the foundations on iron shot laid upon a flat sub-foundation. I suspect that our gravel, especially that which contains the largest proportion of rolled pebbles, may act to some extent like the stratum of shot under the protected houses of Tokio.

PHOTOGRAPHS OF THE CORONA.—Many of my readers are doubtless aware that Dr. Huggins has been struggling with the difficult problem of obtaining photographs of the corona by means of what may be described as an artificial eclipse. He has obtained some faint pictures of rather equivocal character. In order to test the disputed question of whether they are really reliable pictures of the corona, Captain Darwin has, during the recent Grenada eclipse, taken special photographs of the corona (as displayed by the eclipse and companion pictures by Dr. Huggins's device in order to compare them. As the form of the corona, its rifts, and partial extensions are now proved to be very variable, such comparison can only be made between pictures taken simultaneously, or as nearly so as the circumstances permit. Let us hope that the result will be satisfactory, and that Dr. Huggins will be encouraged thereby to apply his well proven skill and perseverance, to the further development of another of his most valuable contributions towards solving the grand problems which solar phenomena present to the minds of thinking men.

PREHISTORIC MAN.—Another discovery has been made in one of the Tremeirchion caves (near St. Asaph, North Wales), which supplies further demonstration of the great antiquity of man. A small, but well-worked flint flake was dug up, in the presence of Dr. Hicks and Mr. G. H. Morton. It was in the bone earth associated with teeth of hyena and reindeer, with fragments of bone and teeth of rhinoceros, and a fragment of mammoth's tooth. The date of this deposit is demonstrably anterior to that great submergence which is indicated by various deposits of sea-sand and marine shells at high levels, pockets of which remain in places protected from the subsequent denudation. The sands of Moel Tryfaen, on the south side of the Menai Straits, at an elevation of 1360 feet above present sea level, present a notable example. Fifty-seven species of marine mollusca have been identified there, all Northern, some of them Arctic. They are associated with vestiges of ancient glaciation.

Thus the men and animals of the Tremeirchion caverns must have lived when North Wales was at about the same elevation above the sea as at present; then came a sinking of 1369 feet, reducing North Wales to a group of rocky islets; then a long period during which 34 feet depth of shelly sand and grave was deposited at Moel Tryfaen; then the re-elevation to present level. In the meantime the whole country was overspread with ice, for everywhere around moraine matter and general debris of glaciers are to be found. The man, the mammoth, the hyena, reindeer, and rhinoceros were probably driven southward as the ice advanced, the same ice sweeping away all vestiges of previous life, save those deposited in caves and hollows.

A MALE NURSE.—The emu appears to be curiously exceptional, as regards domestic division of labour. Mr. Alfred Bennett, who has studied the habits of these birds, states that the hen begins laying about the end of October, or beginning of November, and in about six weeks completes the brood of twenty or more eggs. In the meantime the cock begins to sit, and the eggs subsequently laid are deposited at his side by the hen, he then stretches forth his foot and draws them under him. He not only hatches the eggs, and does all the subsequent nursing, but has to thrash his wife continually, as she attacks him furiously, and would apparently kill the chicks if she could get at them.

In the "Italian Archives of Biology" (vol. vi. Rome, February, 1866), the results of the researches of C. Tomassi-Crudeli are published. One of these decidedly contradicts our usually received notion concerning the effect of artificial drainage and reclamation of marshes, such as those of Ostia and Maccaresa. Crudeli asserts that it would increase greatly the malaria of these regions, and that the hygrometric condition of the subsoil would probably render this increase persistent. He believes that malaria is produced on the earth, not on the water. He finds that while a malarious district is fairly covered with a sheet of water, the malaria is abated or destroyed, and that marshes permanently covered with water are not malarious. I have walked across the Maremma of Tuscany (on the post-road that passes through), when it was well covered with water, and in like manner across the Pontine Marshes, when they were partially covered. Both were then reputed to be safe by the people resident there, but there was something else beside the water to account for this. It was in winter-time, and this is the season when such marshes are usually covered with water. I suppose that Sig. Crudeli has taken this into consideration.

SOLUTION AND CHEMICAL AFFINITY.—Some interesting papers have been read to the Royal Society of Edinburgh by W. Durham on this subject. He explains solution to be due to the affinities of the constituent elements of the body dissolved for the constituent elements of the solvent. Thus chloride of sodium, he says, dissolves in water because of the

affinity of the sodium of the salt for the oxygen of the water, and of the chlorine of the salt for the hydrogen of the water. These affinities not being strong enough to cause double decomposition, an indefinite compound is formed, having the properties of what we call a solution. He illustrates this theory by many examples, which decidedly support it, but there are some serious exceptions, especially among organic substances, such as the solid and liquid hydrocarbons, where the solvent and the dissolved solid are nearly identical in composition. I have only read an abstract of Mr. Durham's papers, and therefore am uncertain whether he has fully considered these.

ANOTHER USE OF BEE-STINGS.—At a recent meeting of the Physiological Society of Berlin in February last, Dr. Müllenhoff referred to a treatise by Kepler, that appears to have been forgotten, on the structure of the cells of bees. He treats the subject mathematically, as might be expected of the great astronomer. A fact was communicated to this meeting which is very interesting, and new to me, though possibly already known to some of my readers. It is that when the bee has filled the cell either with pure honey, or a mixture of pollen-dough and honey, and has completed the lid, a drop of formic acid obtained from the poison bag connected with the sting is added to the honey by perforating the lid with the sting. Numerous experiments show that this formic acid preserves honey and every other sugar solution from fermentation. If this be well established, it will show that the sting and the poison apparatus of the bee has a further purpose than that of a defensive or offensive weapon. Another interesting fact suggests itself in connection with this. So far as I know, most of the insects that have stinging apparatus similar to that of the bee are collectors and storers of honey.

INOCULATION FOR YELLOW FEVER.—While the anti-vaccination people are denouncing the principle of inoculation, Pasteur is extending its application to the prevention of cattle disease, chicken cholera, and hydrophobia; and in the other hemisphere Dr. Domingos Freire, of Rio de Janeiro, is applying it to the prevention of the local scourge of yellow fever. M. Rebourgeon, in a paper communicated to the Biological Society of Paris, described the results obtained by himself and Dr. Freire in December, January, and February last, when the weather of Brazil was intensely hot, and the fever raging accordingly; 3051 subjects were inoculated at Rio, and not one died, while in the same districts and houses 278 of the non-inoculated were killed by the disease. The number of inoculated has since reached 6000, and not one of them has been attacked with fever; and what is still more remarkable, inoculation in the second stage of severe attacks of the fever was followed by recovery in every case.

I am told by those who have lived in yellow fever districts that when a man or woman has a mild attack and recovers, the illness is regarded as a subject for congratulation; only those who have thus been naturally inoculated can regard their lives as of much prospective value. A second and milder attack is still more fortunate, as nearly perfect immunity is then secured. This being the case, the practical conclusion is obvious. If it is possible so to attenuate the virus as to ensure a mild and controllable attack, every sane human being who is compelled to live in the midst of this terrible danger would avail himself of such protection with the same readiness and resignation as he would submit to a necessary surgical operation.

PILE DRIVING BY DYNAMITE.—The "Society of Arts Journal" tells us that this has been lately carried out by a Hungarian engineer, who fixes horizontally on the top of the pile to be driven a circular cast iron plate, 15 inches in diameter, and $3\frac{1}{2}$ inches thick. A dynamite cartridge in the form of a disc 6 inches in diameter, and $\frac{3}{4}$ of an inch thick, containing $17\frac{1}{2}$ ounces of dynamite, is placed on the cast iron plate, and exploded by electricity. It is stated that the depth to which the pile is driven by each explosion "is equal to five blows of an ordinary pile-engine weighing $14\frac{3}{4}$ Vienna hundredweights, falling 9 feet 10 inches," and that a cast iron plate resists on an average 25 explosions. This is interesting as a scientific experiment, but in practical working on a large scale, I suspect that five lifts of the pile-engine monkey will cost less than the dynamite, and the wear and tear of the engine less than the breakage of the cast iron plates, to say nothing of the risk that always accompanies the handling of large quantities of dynamite; and such quantities must be very large where $17\frac{1}{2}$ ounces are exploded at every blow on each of a large number of piles.

HOW TO KEEP COOL IN HOT WEATHER.—In "Iron" of August 12th, some good practical advice is given concerning the cooling of cellars, or rather the keeping them cool. Many people ventilate their cellars in summer-time in order to keep them cool and dry. Such ventilation has exactly the opposite effect; it just makes them damp and warm. The temperature of a closed cellar or other underground cavity of moderate depth corresponds nearly to the annual mean temperature of the air above; therefore in summer it is cooler than the air, in winter it is warmer. It is evident enough that such being the case, the ventilation by means of air at summer temperature must warm the cellar. But this is not all. The quantity of water which a given quantity of air is capable of holding in solution varies with the temperature, and this variation is very great, a difference of twenty degrees Fahrenheit about doubles the capacity of air for water. Therefore if warm saturated

air is circulated in the cool cellar, the air is cooled, and deposits water proportionally, as it comes in contact with the cool walls and roof and floor. We usually blunder all round in this country, probably owing to our exceptional experience of hot weather. In Spain, Italy, and other countries, where hot weather is better understood, windows and doors, and even window-shutters are scrupulously closed during the daytime in summer, are only opened in the night or early morning. When we have a "scorcher," we throw open doors and windows, in order that the scorching may proceed both indoors and outside, and that escape may be rendered quite impossible.

Fig. 148.—Leaf of Sycamore, with black ungus spots.

FUNGUS SPOTS ON SYCAMORE LEAVES.

IN answer to the inquiry that was made in one of the numbers of SCIENCE-GOSSIP as to the cause of the spots on sycamore leaves, several have been already suggested. The most frequent cause of spots on the leaves of that tree is the fungus which I purpose to describe in this article. With the aid of the figures I have drawn from nature, it will be easy to decide whether the spots seen in any case are due to this or any other source. The same fungus occurs on maple leaves, and similar spots, due to an allied fungus, are not uncommon on willow leaves.

The fungus to which I refer is *Rhytisma acerinum*, Fries, but the state in which it is usually seen is that originally called *Melasmia acerina*, Lev. The spots begin to appear in June, and towards the end of July become very conspicuous. When a tree is attacked, usually nearly every leaf is more or less spotted, and the number of spots on each leaf may reach thirty or even more (Fig. 148). They begin with a yellowish discoloration, of a roundish form, about a quarter of an inch in diameter. The yellow spots are caused by the influence of the mycelium of the fungus on the chlorophyll of the leaf; this mycelium grows centrifugally, just beneath the epidermis, probably from a stomate, and destroys the colour of the chlorophyll as

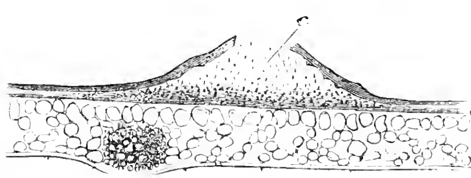


Fig. 149.—*Melasmia acerina* (section through a spermagone). × 70.

it advances. It is confined to the yellow spot; in the still green parts of the leaf no mycelium can be detected

So far the epidermis of the leaf has remained unaffected. But now certain parts of the interwoven mycelium or hyphasma begin to arrange themselves

for the production of sporules. The first sign of this is seen in the appearance on the upper surface of the leaf of small round black dots, which arise from a brownish discoloration of the cuticle. Beneath each of these an hymenial layer is formed by the upturning of the ends of the mycelial hyphæ. These upturned ends assume the function of basidia, that is, each produces a little bud from its extremity, which enlarges and takes the form of a slightly flexuous cylindrical rod. When complete, this rod is yellow border. But though the surface of the spot may appear to the eye uniformly black, yet on holding the leaf up to the light, the places where the sporules are being produced will be easily distinguished by their greater opacity.

A section of the leaf in this stage has the appearance shown in Fig. 149, where *a* is the hyphasma and *b* the blackened epidermis. A portion of the hymenium is shown on a larger scale at Fig. 150, *a* being the upper chlorophyll cells of the leaf, *b* the

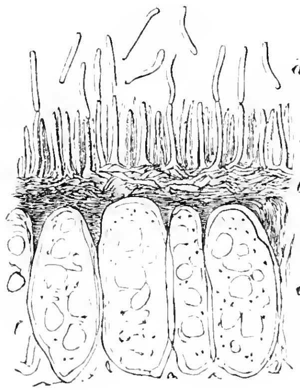


Fig. 150.—*Melasmia acerina;* section of the hymenium of a spermagone, showing the origin of the spermatia. × 1000.

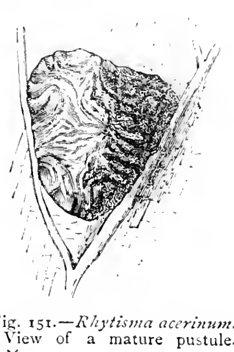


Fig. 151.—*Rhytisma acerinum.* View of a mature pustule. × 3.

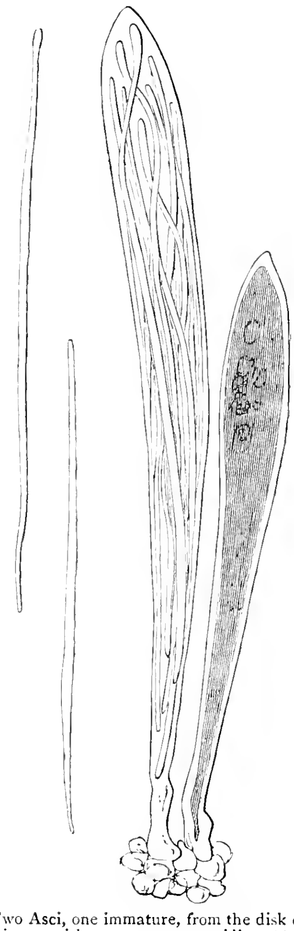


Fig. 152.—Two Asci, one immature, from the disk of *Rhytisma acerinum,* with two separate sporidia. × 1000.

abstricted and falls off, and the formation of another immediately begins. By this process, the space above the hymenial layer becomes crowded with an enormous number of these sporules, and the epidermis is raised in a small blister-like pustule, which opens at the apex to permit the escape of the sporules.

Simultaneously the blackening of the leaf above these places progresses more and more, and finally extends over the whole of the yellow spot, except for a small space round its margin. Thus the final result is a roundish black spot surrounded by a narrow mycelial layer, *c* the basidia, and *d* the abstricted sporules. These latter are perfectly colourless, and measure about 7μ long by 1μ broad. They were formerly called spermatia, from the belief that they were a kind of male organs, having some fertilising power from the exercise of which (in a way unknown) the further development of the fungus arose. The pustule beneath which the spermatia originated was called a spermagone. This view may still be a true one, but I believe nothing is known to support it in this particular case, although in other cases, such as

Polystigma rubrum, bodies similar to these spermatia are, to say the least, strongly suspected of performing the alleged function.

This is all that is produced of the fungus so long as the leaf remains attached to the tree; but after its fall further changes begin to take place. This is shown by a thickening and blackening of the affected part of the leaf, so that about the succeeding March the under surface of the leaf is also blackish, and the mass of mycelium doubles or trebles the thickness of the leaf. The upper surface of the spot, which at first was dull and even, now becomes shining and wrinkled; and in May it assumes the form represented in Fig. 151. The elevated flexuose wrinkles then open along the crest, and the edges of the cracks roll back, thereby exposing the dull whitish hymenial disc which has been gradually forming itself beneath.

It is probable that the production of spermatia ceases in the autumn, and that (whether in consequence of any act of fertilisation or not) the mycelium encloses itself in its dense hard black covering, so as to last through the winter, in fact, to hybernate. Then in spring it commences to grow again, but this time the upturned edges of the hyphæ, instead of abstricting spermatia, grow out into the sac-shaped bodies called asci (Fig. 152), which are at first filled with a dense granular protoplasm. These protoplasmic contents finally resolve themselves into eight elongated-fusiform colourless sporidia, which are nearly as long as the ascus itself, and sometimes more or less spirally incurved at the summit.

When the perfect hymenium is exposed by the turning back of the edges of the fissures, the asci are ruptured (presumably by the continually increasing pressure of the new ones which form around them) and the sporidia are ejected, as Tulasne says, "like smoke." If the latter are then placed in suitable moisture they will germinate by sending out a mycelial thread; and if they happen to have been blown on to the moist surface of a young sycamore leaf, the hypha will penetrate into the tissues (probably through a stomate), and the cycle of development will begin again. If not, they simply perish.

It will be seen that the ejection of the sporidia occurs just at the time when the young sycamore leaves are bursting from their buds. In fact, the whole life-history of the fungus, like that of so many others, has adapted itself to our climate. The fungus is an annual one, and if all the affected leaves could be destroyed in any autumn it would not reappear in the succeeding spring. The same is true of *Rhytisma salicinum* on the leaves of willows; but *R. maximum*, which occurs on willow branches, has a different history. It is, I believe, perennial; the sporules appear in spring, and the sporidia in the succeeding summer.

The only point in the life-history of *Rhytisma acerinum* which remains obscure is the function of the spermatia, of which, as I have said, I believe nothing is known. It may be that, like the uredospores of Puccinia, they simply enable the fungus to spread more rapidly, by germinating and producing fresh spots on other leaves to which they may have been carried. It may be, on the other hand, that they are in the position of so many other similar bodies, of having retained the form but lost the function of spermatia. It is now well known that a complete sexual union occurs only in a comparatively few, chiefly of the lower forms of fungi; as we rise in the scale the reality of the act gradually becomes less and less. The exact form of the sexual organs may even be retained after they have become functionally impotent: the pollinodium may attach itself to the oösphere, but if no fusion of the protoplasms takes place no fertilisation can be said to exist. The performance is but a shadow-play.

Even this morphological semblance of sexual organs becomes gradually less distinct, and finally in the highest fungi disappears entirely. In the Hymenomycetes not even a trace of sexuality is known; and, what is more, the whole bearing of modern discoveries goes to show that this want of knowledge is not due to any want of observation on our part, but merely to the fact, that there are no traces of sexuality to discover. Nor is the philosophy of their disappearance, I fancy, hard to find, but to pursue the subject now would lead me to too great a length.

W. B. Grove, B.A.

Birmingham.

MOLE'S EYES.

The commonly received fallacy, that moles are blind, is of so respectable an antiquity as to date back to the time of Aristotle, B.C. 384.

That great man, of whom Plato spoke as "the intellect of the school," spent much of his time in dissecting animals, and wrote an enthusiastic book upon the subject. But he blasted the reputation of the mole, and his statement has been more or less reverently received for 2270 years. Here is conservatism with a vengeance! One is hardly surprised to find ordinary people speaking carelessly of the mole as blind. To all appearances, it is not only blind, but eyeless, and those only who have either dissected or immersed the creature in water, have been permitted a sight of the small black eyes which can be retracted or exserted at will. But mistaken casual observers will find themselves in good company. Greater minds than theirs have been deceived, and poor Talpa, who might have been proud to find the pen of a Carlyle, a Matthew Arnold, and later still a Drummond, shaping the letters of his name, has to accept the ugly fact as it stands, that but for his supposed deficiency, they would never have troubled their heads about him.

We quote Carlyle—"Latter Day Pamphlets"—"The real Administration, practical management of the Commonwealth, goes all awry; choked up with long accumulated pedantries, so that your appointed workers have been reduced to work as moles; and it is one vast boring and counterboring, on the part of eyeless persons irreverently called stupid."

Matthew Arnold:—

"TO A REPUBLICAN FRIEND.
"If to despise
The barren optimistic sophistries
Of comfortable moles, from what they do
Teaches the limit of the just and true
(And for such doing *they require not eyes*)."

Drummond, Natural Law—"Degeneration":—"There are certain burrowing animals—the mole for instance—which have taken to spending their lives beneath the surface of the ground, and Nature has taken her revenge upon them in a thoroughly natural way—she has closed up their eyes."

Here is enough in all conscience to make the whole tribe of moles protrude their eyes for the sole purpose of weeping over the injustice and inaccuracies of even great men; but courage, *Talpa Europæa*, you have still a champion in the person of the great naturalist Wood, and we may yet find it possible to manufacture an excuse for your detractors. Far away in the very south of Europe, I understand that you have a cousin (*Talpa cæca*, by name) whose eyes are always covered by the eyelid.

Was this the mole that Aristotle dissected? and were Carlyle, Matthew Arnold, and Drummond aware of its existence? Charity—Let us hope all things.

N. F. LAYARD.

Turleigh, Bradford-on-Avon.

AROUND HASTINGS IN AUGUST.

By the Rev. HILDERIC FRIEND, F.L.S.

WELL as I know the Hastings District, I never more thoroughly realised what a paradise it is for the naturalist, whatever his particular line of study may be, than during my recent visit there in the August vacation. I had gone down prepared to bring away anything that might come in my way, from a foraminifer to a whale, or a micro-fungus to an ammonite. Botany had the first place; the vegetable parasites being special objects of desire; but conchology, entomology, geology, archæology, and other 'ologies were each to be allowed a share of my attention. I will only say of conchology that, with the exception of *Helix Cantiana*, *H. caperata*, and *H. virgata*, I found few land shells in any quantity, while marine shells were scarcely to be expected until some stronger winds had blown and churned the sea into a rage. So with marine algæ, zoophytes, and other marine objects. But what I failed to obtain from this rich locality by personal research, my friends on the spot supplied, and many a rich seaweed, curious sponge, and many chambered zoophyte now lies lodged in my cabinets which before were mine only in name. In entomology I had the pleasure of spending a couple of days with the venerable rector of Guestling—no mean authority on almost every branch of Hastings natural history—and another gentleman, and such things as *Volucella inanis*, various beautiful ichneumons, *Strangalia armata*, *Aphodium*, &c., from different orders of insects were the fruit of our excursions. The castles at Hastings, Pevensey, Camber, and Hurstmonceux, with the abbey at Battle, and the various churches, and other buildings in the neighbourhood proved a feast of fat things, and many details are still left unmastered, as a bait for another time.

It was among the wild flowers, and their pests, however, that I was able to do the most work, and it is my purpose here to enumerate a few of the principal finds in these departments of science. Respecting the flowering plants, it is not to be expected that anything very new or startling can be advanced. Still, it may interest my readers to know what they may hope to find after midsummer in this district, and where to look for the same. The best thing of all probably is the rare *Centaurea Jacea*, which the Rev. E. N. Bloomfield, M.A., of Guestling, has found in several places in the neighbourhood of Fairlight and Guestling. *Eufragia viscosa* is said to grow about Bexhill, but I had the good fortune to alight on it in a field on the skirts of Archer Wood beyond Battle. The pretty white fumitory abounds on the Crumble, between Wallsend and Eastbourne, where may also be found the yellow horn poppy, the clematis, plenty of *Silene maritima*, the wood groundsel, covered with its golden rust (*Coleosporium Senecionis*), the black thorn with its leaves ruddy under the influence of *Polystigma rubrum*, &c. The spiny knapweed (*Centaurea calcitrapa*) is abundant here too, while the arrow-grass (Triglochin), frog-bit (Hydrocharis), various species of polygonum, typha, water milfoil, pondweeds, and other marsh-loving plants grow in great luxuriance between Pevensey and the sea. On the castle, as well as at Hastings, the fennel (*Fœniculum vulgare*) blooms; the viper's bugloss makes a glorious show, and the common storksbill thrives on shingle, sand, and rock. Tansy, beet, and celery—favourites in our gardens—are but a few of the plants found in the Hastings district, which, under cultivation, have been made a blessing and boon to man. The medlar and checker, or wild service-tree, both bear fruit here, and have every appearance of being truly wild. The bog asphodel, gentian, sundew, lesser skullcap, violet, and other bog-loving plants are to be found by such as know where and how to search. The Tutsan (*Hypericum Androsæmum*), known locally as amber, is common, but *H. elodes* is only sparingly found.

The streams are gay with the purple Lythrum and various species of willow-herb, while the tall yellow Lysimachia is common in some places, and makes a beautiful show. That curious and interesting plant, the butcher's broom (Ruscus) is plentiful between Bulverhythe and Hollington, while the woods and hedgebanks yield earlier in the year a profusion of primroses, cowslips, sweet-violets, adoxa, bluebells or wild hyacinth, and other bonnie blooms. The broom and gorse are accompanied by *Genista Anglica* and *tinctoria*, while the spotted medick (*M. maculata*), the yellow melilot, the strawberry clover, with the haresfoot and subterranean varieties, *Trifolium scabrum*, *Lotus angustissimus*, *Lathyrus Aphaca*, *L. Nissolia* and other interesting legumes are to be found. The two buckthorns, the spindle tree, the beautiful marsh-mallow, the musk mallow, sea heath, sea convolvulus, sea holly, sea spurrey, germander (*Teucrium Chamædrys*), vervain, thorn-apple, dodder, periwinkles, *Carduus tenuiflorus*, carline and stemless thistles, and a host of other autumn plants are to be obtained.

Fortunately I was able to study the cryptogams under very favourable circumstances, and have been able to add a good number of micro-fungi to the already existing kinds. Clustercups, of course, were not to be expected in any quantity at this season of the year, but among the Pucciniæi the following were the principal records. The rose brand (*Phragmidium mucronatum*) with its uredo form, very plentiful on both cultivated and wild roses. Bramble brand (*Ph. bulbosum*), with its uredo, raspberry brand (*Ph. gracile*), and strawberry brand (*Ph. obtusatum*). Pucciniæi on the reed, wood rush (*P. Luzulæ*), amphibious polygonum (*P. amphibii*), primrose, mint, mallow, composites (*P. compositarum* on *Centaurea Calcitrapa*), thistle, golden-rod, nipplewort, dandelion, goose-grass (*Puccinia difformis*, rare at Baldslow), hog-weed (plentiful near Catsfield), violet, willow-herb, and plum-tree (plentiful at Pevensey, Hurstmonceux, and elsewhere). Besides the uredo form of many of the foregoing, we find St. John's wort uredo plentiful near Netherfield Church, on Tutsan, *Uredo potentillarum*, and *U. bifrons*. Rust abounds on the coltsfoot (*Coleosporium Tussilaginis*), campanula, sow-thistle, and groundsel. The birch in some places was covered with rust, summer spores of *Melampsora betulina*, while nearly every willow had one form or other of Lecythea. It was interesting to find the sandwort whiterust (*Cystopus Lepigoni*) both at Bulverhythe and Pevensey, while the ubiquitous crucifer whiterust of course turns up. Lecythea on bramble, rose, spurge, willow, plentiful. Corn-rust, luzula-rust, with rust (Trichobasis) on mint, nipplewort, fool's parsley, hog-weed, and bean, clover, thistle, knot-grass, violet, willow-herb and primrose, were also secured. The dirty mould on figwort (*Peronospora sordida*), *Ramularia Lapsanæ*, *Polyactis*, hop-blight (*Sphærotheca castagnei*), maple blight (*Uncinula bicornis*), Burdock blight (*Erysiphe montagnei*), buttercup blight (*E. communis*), *Polystigma rubrum* on sloe at Pevensey. Clustercup on coltsfoot and goose-grass (*Œcidium Galii*), *Sepedonium chrysospermum* parasitic on fungi in woods, and a few others, certainly make a by no means meagre list for one collector to take within a fortnight. To give details of mosses, lichens, ferns, and other cryptogams would be impossible in this paper, but enough has surely been said to make out a good case for any one who wishes to decide whether he could spend his next holiday profitably in this part of the country. The local lists and supplement of nature's productions around the classic town of Hastings are already amazingly long, but they are said to be receiving new additions every year. I am happy to be able thus to add my mite to this store of useful information.

SCIENCE DIRECTORY.

Dewsbury Naturalists' Society. President, C. P. Hobkirk, F.L.S. Hon. Sec., J. Summersgill, Moorlands Terrace, Dewsbury.

Rochester Naturalists' Club. President, H. L. Dampier, F.C.S. Hon. Sec., J. Hepworth, Union Street, Rochester.

SCIENCE-GOSSIP.

The American vessel *Enterprise* has run a line of deep-sea soundings from Wellington, New Zealand, to the Straits of Magellan. The depth was but 1562 fathoms, the depth increasing east and west of this. This line of soundings runs very close to the ice-limit. The *Challenger*, in 1875, ran a line in about 40° S. lat., and in the same year the German ship *Gazelle* executed a series of soundings between that of the *Challenger* and that of the *Enterprise*.

The United States Hydrographic Office has laid out a plan by which the entire Pacific, north of the *Challenger's* line, can be surveyed by lines run at short distances apart. This will be carried out by the United States war vessels.

At a recent meeting of the Philadelphia Academy, Dr. H. Allen called attention to changes in the form of limb bones depending upon the weight they bear. The sloth, bat, and seal, different through their habits and limbs, agree in placing no compression upon the bones of the hinder limb; and in all three, the neck of the femur is shortened, and its shaft flattened, while the astragalus is lengthened. The direction of the condyles of femur has constant relation to the weight supported. The effects of suspension were also considered.

All the southern districts of Russia have been suffering greatly from the Hessian fly. This insect made its appearance during the present summer in Essex and Hertfordshire.

The celebration of the centenary of New South Wales takes place in 1888. The Government invite the members of the British Association to hold their annual meeting for that year in Sydney. The invitations will be extended to all the British Universities, literary, scientific, and art societies.

The British Association meeting is over, and it has been unusually successful from a scientific point of view. The address of Professor Crookes, F.R.S., cannot fail to be a fresh starting-point, both for speculation and investigation in chemistry and physics. Professor Crookes is of opinion that the so-called elements were evolved from a common kind of matter, just as biologists teach that all forms of animal and vegetable life that peopled the world in past geological ages, and which still inhabit it, were derived from *protoplasm*. This primitive and original basis of matter may be identical with that unknown and mysterious substance seen in the corona of the sun and known as *Helium;* but Professor Crookes prefers to call it *Protyle*. The theory of the gradual evolution of the seventy chemical elements, beginning with *Helium*, then proceeding to hydrogen, &c., was worked out in the most brilliant manner.

Professor D'Arcy Thompson exhibited some skulls of embryo narwhals and other cetacea, about an inch long. He argued that the specimens showed very primitive features not consonant with the view, that the whales are most closely allied to the hoofed mammals.

Mr. L. Upcott Gill continues to issue his sevenpenny parts (illustrated) of the "British Cage Birds" and "Fancy Pigeons." Thirteen parts have now appeared.

We have received copies of the useful catalogues of second-hand scientific books from Messrs. W. Wesley, Essex Street, Strand, and W. P. Collins, 157 Great Portland Sreet.

A periodical we are always pleased to receive is the "Rochdale Field Naturalists' Journal."

The celebrations in connection with the Chevreul ceremony took place in Paris the last Tuesday in August. M. Chevreul was born at Angers on August 31st, 1786, and he is still well, and never fails to attend the Monday meetings of the Academy.

We regret to record the death of Dr. Wakley, editor of the "Lancet," on August 30th.

Professor Barff, the well-known chemist and author, has just died, aged 63.

MICROSCOPY.

Staining Vegetable Sections.—As some of your readers may have found that on lifting thin vegetable sections from one fluid to another, so many times as it is necessary to do in double staining them, they are liable to get broken, it may interest them to know a method I have found very successful of avoiding this difficulty. After the sections have been cut and the paraffin removed from them, they should be put in specimen tubes (those I use are an inch long and $\frac{7}{8}$ in. wide). A piece of muslin should be tied over the mouth of each tube. To bleach the sections the tubes should be put in chlorinated soda, or into a bottle containing water, through which chlorine should be passed. After bleaching, the tubes, (still keeping the muslin over the mouths) should be put in a large basin of water, and the water changed several times, then the different stains can be poured into the tubes and poured out again. The sections can be bleached, washed, put in a mordant stained with carmine. Put in an acidulated water to fix the carmine stained with aniline green, cleared in benzole or oil of cloves, without once handling them.—*Fred Beddow, Derby.*

Wilks' Cell.—It is somewhat difficult to give R. S. P. the information he seeks on the manner of using the Wilks' cell, without first knowing how advanced he may be in the preparation of objects without pressure. It requires a considerable amount of care to get the objects ready for the cell, but when this is done the mounting of them is the easiest part. If R. S. P. refers only to this latter part, he will find no difficulty if he proceeds as follows. Take a cell and see that it is no deeper than the object requires. If it is too deep it can easily be flattened between two pieces of glass by pressure, until the exact depth is gained. All that remains then to be done is to place it on a clean slip, fill it with thick balsam, and, immersing the prepared object, put on the cover glass. In using the thick balsam, numerous air bubbles will most likely appear in the cell. This is a small matter, for if kept in a warm place they will gradually work to the edge and disappear. If R. S. P. wishes for anything like full information on the preparation of objects for the cell, I fear it cannot be given without devoting at least one article to the subject. The Wilks' cell is a very useful introduction, and deserves to be largely used. Prior to its invention I have frequently extemporised one from a vulcanite cell, that sufficiently answered the purpose, although at the cost of time and trouble. Still I think the cell is open to improvement, and would suggest that it had at least twice the number of elevations, or, perhaps better still, was corrugated, as in its present form the cover glass is likely to get broken unless well banked up with edging colour, as there is so large a space between the supports.—*J. W. Neville, Handsworth, Birmingham.*

THE ROYAL MICROSCOPICAL SOCIETY.—The last Journal of this Society contains, in addition to the useful summary of microscopic information relating to botany, zoology, &c., a paper by George Massee on "The Structure and Evolution of the Florideæ," illustrated with exquisitely drawn plates.

NEW SLIDES.—We have received from Mr. H. P. Aylward, 164 Oxford Street, Manchester, a beautifully mounted slide of British Foraminifera, containing five characteristic species, which we heartily commend.

COLE'S "STUDIES IN MICROSCOPICAL SCIENCE."—Sections 1, 2, 3 and 4 of the second number of the fourth volume of this ever-welcome work have just appeared, dealing with "The Cell-wall, its structure and properties;" "Spermatozoa of Vertebrata," "Normal Kidney," and "The Sea Fans." Each part is beautifully illustrated, and, with their accompanying slides, render the student's work both easy and delightful.

"THE ROTIFERA."—The fifth part of the monograph on these lovely and interesting creatures has just been published. Dr. Hudson and Mr. Gosse's work is now approaching its close, only another part being required to complete the whole. The present continues the *Notommatadæ*, and commences with *Ploïma* in the Loricated group of rotifers, giving all the various family groups. The plates are very beautiful, and are crowded with well-drawn and easily recognised objects.

THE QUEKETT CLUB.—The September number of the Journal of this Society contains the following papers:—"On Diatomic Structure," by Henry Morland; "The Microscopical Structure of the Diatomic Valve," by Julien Deby; "A Salt-Water Monad," by E. M. Nelson; "A Fossil Diatomaceous Deposit from New Zealand," by E. Grove and G. Sturt; besides notes of the Proceedings, &c.

ZOOLOGY.

GNATS AND GNAT-BITES.—At a recent meeting of the Entomological Society of London, Professor Westwood exhibited five specimens of a species of *Culex*, supposed to be either *C. cantans* or *C. lateralis*, sent to him by Mr. Douglas, who had received them from the Kent Waterworks. It was stated that they had been very numerous in July last, and that persons bitten by them had suffered from "terrible swellings." Professor Westwood also exhibited some galls found inside an acorn at Cannes in January last.

THE MOLLUSCA OF CLONMEL, IRELAND.—Permit me to add the following to the list of mollusca which Mr. Cockerell published in your August number for Tipperary and North Waterford:—*Limax cinereo-niger*, *v. nigra*, co. Wat.; *Helix memoralis*, v. with pure white lip, co. Wat.; *H. aculeata*, co. Wat.; *Vertigo pygmæa*, co. Wat.; *Hyalina fulva*, co. Tip.; *Bullinus obscurus*, co. Wat.; *Valvata cristata*, co. Wat. and co. Tip.; *Planorbis nitidus*, co. Tip.; *P. albus*, co. Tip. and co. Wat.; *P. parvus*, co. Tip.; *Physa hypnorum*, co. Tip.; *Limnæus auricularius*, *v. acuta*, co. Tip.; *Ancylus lacustris*, R. Suir, co. Tip. These, with those already mentioned by Mr. Cockerell (to whom I am very much indebted for information), have been taken within a radius of three miles of the town of Clonmel.

MAN'S LOST INCISORS.—A paper on this subject was read at the British Association meeting by Professor Windle. It dealt with abnormalities of the human incisor teeth, viewed in the light which they throw upon man's past, present, and future incisive dentition. A number of specimens were exhibited, which were grouped under eight series. (i.) Supplemental teeth (incisiform); (ii.) supernumerary teeth (conical); (iii.) co-existence of supplemental and supernumerary teeth; (iv.) substitution of a supernumerary tooth for a normal incisor; (v.) substitution of two supernumerary teeth for normal incisors; (vi.) absence of one incisor; (vii.) absence of one incisor, diminution or malformation of another; (viii.) absence of both lateral incisors. From these specimens the following deductions were drawn:—(1) That man's original dentition included six incisors in either jaw. (2) That two have been lost, which are the lateral on each side in either jaw. (3) That this loss is due to the contraction of the anterior part of the palate. (4) That consequent upon the still progressing contraction, man's dentition will be in course of time still further reduced by two incisors in either jaw. (5) That the conical type of many of the supernumerary teeth indicates a reversion to the primitive type of tooth.

BOTANY.

THE "LONDON CATALOGUE."—When I penned the note that appeared in the July SCIENCE-GOSSIP, I was not aware that the eighth edition of the "London Catalogue" had appeared. Having obtained a copy, I was amazed to find that this edition differed as widely from previous editions as Hooker's "Students' Flora" differed from its two previous editions. In fact, the editors of the two publications openly profess that they are in league. Like Mr. Wheatcroft, I do not complain of changes in the classification, because we must ever be improving and advancing in that direction, but I do complain of the changes in nomenclature, because no good end can be served by this everlasting shifting of names. So long as the name is a fixture, it is of

no consequence what you call a plant; but it is of consequence as to what position you put the plant in in the scale of life. Our only apology for the long scientific names that so terrify the general public is that they are necessary to secure precision of ideas amongst botanists who live wide apart, and to avoid the uncertainties that attend local common names. Nevertheless, every new edition of our standard works plunges us into greater uncertainty than if we relied upon the popular names. Why, for example, should the long-familiar name of *Chlora perfoliata* be changed into the uncouth *Blackstonia?* and why won't *Carduus* do as well for thistle as the unpronounceable *Cnicus?* There can be no good reason for a change of name when once it has come into use. Priority of nomenclature to all such considerations is nothing compared with the question of general recognition and custom, because the name is no part of the thing itself, but only what we designate it. A name is only useful when it precisely indicates what we are talking about; but if there is a fresh synonym every few years, there will be no end to the words required to extricate ourselves from confusion. There can be only one object in making these alterations, and that is to compel botanists to buy the new editions. The rich and leisurely like new books, and to them these changes are of little moment; but it is because the rich buy them that the poor botanist must do likewise, or find himself regarded with some disdain as being behind in the march of progress. Botanists must strongly protest against this state of things, or they will become more and more at the mercy of book publishers.—*John Hamson, Bedford.*

THE BRITISH FAUNA AND FLORA.—Some years ago an extra number of SCIENCE-GOSSIP was published, devoted to the British Hepaticæ, giving short descriptions and figures of the species. Could it be so arranged that this plan might be carried on, and extended to other subjects? There seems to be a dearth of accurate collectors' lists in the different branches of our fauna and flora. In the case of the fauna more particularly so. The wild flowers are well represented in the "London Catalogue," &c. But mosses, hepaticæ, algæ, ferns, grasses, fungi, &c., might each form the subject of a separate number or numbers. It would, I do not doubt, be a great boon to the readers of SCIENCE-GOSSIP and many others, if periodically—say every six months—an extra number was published, giving lists with short descriptions, and when possible, illustrations, covering in the course of time, all British species. We should then have in a complete, accurate, cheap form, good working lists that could be interleaved at a trifling expense to be used as guide and note-book. To persons devoting time to the study of the natural history of any given district, the help afforded by such handy lists would be invaluable.—*C. T. Musson, Nottingham.*

FERTILISATION OF FLOWERS.—Since reading Mr. Paulson's communication respecting the fertilisation of *Antirrhinum majus* by bees, a parallel circumstance has come under my notice. A few days ago I noticed a common honey-bee searching about amongst the blossoms of a columbine plant, and on looking to see the method which it adopted for extracting the honey, I saw that, instead of entering the corolla of the flower, it alighted on the outside of the thin end of the tube and pierced a hole in it with its proboscis, and so obtained access to the honey which might be inside: in that manner it visited flower after flower. I gathered several blossoms, and found they were all pierced more or less, the tubes of the one from which I drew the accompanying illustration being a perfect network of holes in the small end. They are not easily detected from outside; but if the flower be held up against the light, so that the observer may look into the mouth of the corolla as into a tube, the punctures will be seen very distinctly, and will generally be found to be very numerous; but it is possible that some of them may be the work of other insects. I have since noticed one of the smaller humble bees visiting the inside of the flowers and collecting pollen from the stamens.—*J. Herbert Allchin, Sutton Valence, Kent.*

CYCLAMEN HEDERÆFOLIUM.—I should be glad if any informant can tell me of the occurrence of this plant in a wild state in Sussex during the last thirty years, as I find it still included in the 8th "London Catalogue." In the "Phytologist" of 1852, Mr. Newman says, "I have never seen this plant in a native locality, but have a fine root purchased of the late James Potter, and said by him to have been found in Sussex." Mr. Hemsley mentions a single plant found in 1850 by Mr. W. W. Saunders, near Hastings, since destroyed. Since collectors continue to apply to Sussex botanists for this plant, if it is extinct, or probably so, it may be well to place the fact on record.—*F. H. Arnold.*

THE "LONDON CATALOGUE" AND HOOKER'S "FLORA."—Mr. Hamson and Mr. W. G. Wheatcroft seem to have ignored a matter of no little importance—namely, that botanical classification and nomenclature are not yet amongst the exact sciences, like mathematics; change and improvement are still possible. Of Mr. Hamson's almost petulantly ill-tempered strictures concerning the new edition of Sir J. D. Hooker's Flora, little need be said, except that the spirit they breathe will rob them of much of their intended effect. If Mr. Hamson prefer to adhere to custom, he is, of course, perfectly free so to do; doubtless it will be convenient to him, but in so doing he parts company from the noble brotherhood of scientific men who prefer advancement at any cost to stagnation, and whose bitterest and most stubborn foe has been *custom.* Mr. Wheatcroft complains of the substitution of unfamiliar names for many of

those which are household words. Such change may for a moment or two be a little puzzling, especially as their synonymy is not always indicated; but there can be little doubt that the compilers of the "London Catalogue" have not acted capriciously in this matter, and doubtless they would be able to give solid reasons for the action, were they interrogated. Mr. Wheatcroft says he prefers Professor Babington's Flora to that of Sir John Hooker; for myself, I reverse that choice, and take Hooker as my *vade mecum*. But neither of us, I suppose, will condemn the other explicitly for making such choice, inasmuch as each has exercised his judgment on the relative value of the two books, and taken that which impressed him most favourably. And yet while we amateur botanists claim absolute freedom in our choice of guides, such guides are condemned for exercising a like freedom of judgment in prescribing our pathway. This is scarcely fair. How many of us can legitimately claim a botanical knowledge so vast, and experience so extensive and unique as are possessed by Sir J. D. Hooker? And yet on reference to the preface to the 3rd edition of his Flora, it will be found that, in his anxiety to produce a book worthy of the subject, even he has not scrupled to seek the aid of specialists, in order that he might be able to place in the hands of students the fullest and latest information accessible, and in a form as compendious as possible.—*F. J. George, Chorley, Lanc.*

Prothallia of Ferns.—Mr. J. Morley contributes a note on the cultivation of *Fern Prothallia* for laboratory purposes. He remarked that amongst British ferns the spores most easy to germinate are those of *Osmunda regalis* and *Lastrea filix-mas*. Rather less easy are those of various species of *Polystichum* and *Athyrium*. To collect the spores, lay the frond, when the sporangia are dark-brown, between sheets of unglazed paper, and keep dry till wanted. The spores will fall into the paper, and when wanted tip off all that were loose. The spores can be grown on pieces of sandstone, slate, peat, &c., and whatever the growing medium, it should be previously sterilised by pouring over boiling water.

The Falling of Leaves.—Professor Hillhouse, in a paper on this subject, said he had taken observations on this subject every autumn since 1882, and hoped in the course of twelve months to complete them. At first sight it might seem peculiar that a question of that kind should be spread over so long a period. The cause was that there was no safe apparent guide as to the exact ripeness of the leaf. The colour of the leaf failed to afford that information, and the fall of the leaf was no guide. His method of experiment had been to tie the leaves to the twigs, so that when the former gave way they were suspended by the twine. If the fall occurred during frost or windy nights the leaves were discarded, only those being selected that apparently fell in perfect maturity on a comparatively still and not frosty night. The subject had been approached from two points of view—the mechanism of leaf-falling, and the transfer of the cell contents from the leaf to the stem; the former dealing with the power of the leaf itself, and the latter with the amount of loss that took place to the plant itself by the fall of leaves over and above the actual skeleton, so to speak, of the leaves themselves. He found that the leaf fell from the increased turgidity of the cells and the abcess layer, which became strongly rounded, greatly diminishing their adhesiveness. The turgidity appeared to arise from the root absorption continuing at a greater pace than the leaves could pass the water off, so that the accumulation of water caused an expansion of the tissue; consequently the cells became rounded, and passed out of contact. Tannin and starch were especially abundant in the food-layer at the base of the leaf-stalk, but in naturally fallen leaves starch was rarely found, except at the very base of the stalks, and then in small grains.

Nitrifying Organisms in Soil.—Mr. R. Warrington read a paper at the British Association meeting on "The Distribution of the Nitrifying Organism in the Soil." He said that previous experiments, conducted at Rothamsted, on this subject had led to the conclusion, that the nitrifying organism is always to be met with down to nine inches from the surface, and that at eighteen inches it is sometimes present; but experiments with soil two to eight feet from the surface had failed to yield evidence of the presence of the organism. Further experiments have been made in 1885, and during the present year, both in the field with the stiff clay subsoil previously worked on, and in another field having a loamy subsoil. In all, sixty-nine new experiments have been made. The new results show a far deeper distribution of the nitrifying organism than was concluded from the earlier experiments. The power of producing nitrification is now found to exist generally down to three feet from the surface. Below this point the occurrence of the organism becomes less frequent, though at five and six feet about half the trials resulted in nitrification. With soil from seven to eight feet no nitrification was obtained. The considerable difference between the earlier and later results is to be attributed to the employment of gypsum in the later solutions. The nitrifying organism in the subsoil is indeed less abundant, and probably much more feeble than in the surface soil, and is apparently unable to start nitrification in the decidedly alkaline solution which urine produces in the absence of gypsum.

Causes of Variation in Plants.—Dr. Patrick Geddes read a paper on this subject. The writer first pointed out that, while the fact of the origin of species

by evolution was no longer disputed, nor the operation of natural selection upon organised form denied, the absence of any general theory of variation was still practically complete. For some writers the variations were simply accidental, for others at least one of the causes lay far beyond our present powers of analysis. Any theory attempting to do this must answer at once the widest and the most detailed questions—must explain the structure of individual species, on the one hand; and, on the other, solve such problems as (1) the origin of the flower from a shortened vegetative branch; (2) the origin of such shortened inflorescences as those of the daisy from ordinary elongated ones; (3) the origin of perigynous and epigynous flowers from hypogynous ones, and so on. The general explanation was simply found in the long-familiar antithesis of vegetation and reproduction. For just as the vegetative axis was shortened into a flower, so was the inflorescence, and so, too, was the axis of the flower itself. The forms of many fungi, algæ, &c., were similarly to be explained. In all cases a vegetative surface outgrows these reproductives, which becomes shortened, flattened, and even concave. The same principle was further applied to explain the subordination of the sexual generation or prothallus of ferns, the comparative failure of the mosses, the origin of the higher plants, and so on; and its applicability to the interpretation of the details of a common plant was finally illustrated by a comparison of the floral and leafy structures of the common wild geranium.

GEOLOGY, &c.

British Petrography, by J. Harris Teall (Birmingham: Watson Bros.). The seventh part of this invaluable work has just appeared, in which there is commenced a chapter on "Serpentine." The colour-plates are fully up to the high artistic standard of their predecessors in the series, and deal with "Felspar-Augite-Hornblende Rock," "Enstatite-Dolerite," and "Felspar-Augite" rocks. A key-plate accompanies each coloured impression, so that the student can easily pick out the characteristic animals seen in microscopical sections.

The Antiquity of Man.—In the Anthropological section of the British Association, Dr. Hicks read a paper on "Evidence of Pre-Glacial Man in North Wales." He described the conditions under which some flint implements had been discovered during researches carried on in the Litynnon Benho and Caer Gwyn Caves in the Vale of Clwyd, in the years 1884–6. The caverns were explored by himself and friends for the first time in 1884, and some of the results were given by him in a paper at the last meeting of the British Association. The facts then obtained had led him to the conclusion, that pleistocene animals and man must have occupied the caverns before the glacial beds which occur in the area had been deposited, as it had been found that, although the caverns are now four hundred feet above the level of the sea, the materials within them had been disturbed by marine action since the pleistocene animals and man had occupied them. Moreover, deposits with foreign pebbles similar to those in the glacial beds were found in caverns overlying the bones. The results obtained this year were highly confirmatory of his views, and had an important bearing on the antiquity of man in Britain. Stet Cave had been blocked up by a considerable thickness of glacial beds which must have been deposited subsequently to the occupation of the cave by the pleistocene mammals. A shaft was dug through these beds in front of the entrance to a depth of over twenty feet, and in the bone and earth which extended outwards under the entrance, a small well-worked flint flake was discovered, its position being about eighteen inches beneath the lowest bed of sand. It seemed clear that the contents of the cavern must have been washed out by marine action during the great submergences in mid-glacial times, and then covered by marine sand and an upper boulder clay. He believed that the flint implement, lance heads, and scraper form in the caverns were also the same age as the flint flake, hence that they must all have been the work of pre-glacial man.

The Ancient Cave-men.—MM. Marcel de Paydt and Maximilian Lopest, of Liège, have made the following discovery. In a cave at Spy, a few miles from Namur, they have found in the sandstone two human skulls of extraordinary thickness, resembling the celebrated Neanderthal skull. These have the same projecting eyebrows, and the same low sloping forehead of a decidedly simian character. It is suggested that these are types of skulls of the primitive race who dwelt on the Sambre. Among other objects discovered in the cave were thousands of flints carefully dressed on one side; also specimens of jasper and agate, minerals not found anywhere in the neighbourhood; ivory breast-pins, red ear-pendants, and necklets of curious design. There were no representations of animals. All were found in sandstone, three layers of which were plainly discernible. The remains of flint, &c., deposited in each layer indicated different stages of skill in workmanship. The lowest stratum was by far the poorest in the number of the objects found and in the quality of their workmanship; but it was here that the skulls were found. A careful drawing has been made of the geological section of the cave, so as to mark precisely the point where the skulls were found.

The Glacial Formations of the Midlands.—Dr. Crosskey read a paper at the British Association meeting on "The Glacial Formations of the Birmingham District," with which he incorporated a

"Report on the Erratic Blocks of England and Wales." With regard to the question as to what are the lowest beds in the Midlands, Dr. Crosskey mentioned that the best section of the Midland series that had been exposed was at California. At the base was a thick ice-formed clay, with erratics dropped into it. In the California lower boulder clay at Wolverhampton Lake blocks of Scotch granites, with a few flints, had been found. It was a distinct type, as containing a collection of erratics from several districts. Some of the contorted sands and clay of the districts probably were deported at an early period in the glacial epoch, having been subsequently contorted. Passing on to the question of "Are there any glacial beds distinctly referable to the period of glacial subsidence?" he said that marine shells with Arctic species had been found in two localities, at Wellington and Lilleshall; supporting the theory, that there must have been a Midland glacial sea. In Icknield Street, Birmingham, the rock was struck and smashed by ice laden with Welsh boulders. Owing to the subsidence of the land, blocks were floated off by the ice starting from the various points in the ever-widening land area, which was covered with ice during the later period. Rowley Hill, Charnwood Forest, Malvern Hills, were centres of dispersion of their rocks.

NOTES AND QUERIES.

GIANT PUFF-BALLS.—At the Field meeting of the Hackney Microscopical and Natural History Society, this afternoon, (August 7th), I discovered upon a dung-heap in a field between Chigwell Lane and Abridge, several specimens of the giant puff-ball (*Lycoperdon giganteum*). One specimen measured 5 feet 3 inches in circumference, and the weight in the opinion of the several members could not have been less than twenty pounds.—*John Avery*.

SPOTS ON SYCAMORE LEAVES.—If what W. B. Drummond asks about at p. 167, are the large shining black spots which are so common and abundant on sycamore-leaves in the summer and autumn, I would say they are the fungus *Rhytisma punctatum*. A similar plant (*R. acerinum*) is found on maple-leaves, and another (*R. salicinum*) on willow-leaves. The fungus *Capnodium footii*, which Mr. Friend, at p. 190, suggests as the black spots, is not found that I am aware of on sycamore, it is moreover not at all common, and is so small as not to attract notice in the way Rhytisma does. With all respect to J. Muir, who, at page 179, quotes a reply to a correspondent, and to the author of that answer I would say, that drops of rain or dew, if they acted as sun-burners, by condensing the solar rays, would produce not black but merely discoloured spots, such as are frequently seen in greenhouses on plants not properly shaded. When I read the paragraph that J. Muir quotes, I tried the experiment on various kinds of leaves with several small burning lenses, and in not a single instance was a black spot or anything except a dirty coloured one made.—*H. W. Lett, M.A.*

SHOWERS OF SHELLS.—After a rather prolonged period of dry hot weather, a heavy thunder-shower fell on the north side of the parish of Illogan, about three miles from Redruth, Cornwall, about 9 P.M. on Thursday, July 8th, the wind being N.N.W. On the following morning, a farmer resident in the district, going to his work about 6 A.M., noticed that the road and fields in the track over which the shower extended were strewed with small snails of a kind quite different to any previously observed in the district. They were then, he states, lying about in such numbers that he could gather them together in handfuls. At this time (August 4th), they are thickly strewn among the grass of the meadows, upon which they are apparently feeding. It is unfortunate that attention was not directed earlier to the phenomenon, that it might have been observed whether there were any on the roofs of the cottages in the vicinity; this cannot be done now, as the abundant rains that have subsequently fallen would have washed them away. Similar shells have been observed in very small quantities on the sands skirting the sea beach about two miles to the north-west; but it is stated that none of this sand has for very many years been placed on the meadows where the creatures are now found in the greatest abundance. Probably some of your readers may be interested in hearing of the occurrence, and may be able to suggest an explanation. The shells sent enclosed have been placed in hot water to preserve them from decay.—*R. J. Connock.*

FLIGHT OF BEES, &c.—I was certainly under the impression that Goldsmith meant the nectar, for it appears to me that a child would know that a bee must enter the flower to obtain pollen, *i.e.* a peculiar dust spread over the anthers of flowers. It is perfectly obvious that the bee could not get the pollen unless it did enter the flower. I am not in the habit of purposely misquoting to gain a point. I have seen several different kinds of bees attack the flowers from the outside. Thus Mr. Wailes, "Entomological Magazine," vol. i. p. 525, says, "That all bees on their first visit to the blossoms of a passion-flower (*Passiflora cærulea*), on the wall of his house, were for a considerable time puzzled by the numerous overwrapping rays of the nectary, and only after many trials succeeded in finding the shortest way to the honey at the bottom of the calyx, but afterwards they proceeded to the most direct mode of obtaining the honey." A similar fact is related of the humble bees by Huber, with regard to beam-blossoms, "Philosophical Transactions," vol. vi. p. 222. Bees placed in a hive in a new locality will, on the next day, fly around the hive in every direction, as if to observe the surrounding objects. I repeat, there is no insect about which naturalists, poets, etc. vary so much in their opinions as the bee; this is notorious. They disagree and vary as to functions of the antennæ, as to the sense of hearing, as to the treatment of their young; they are not agreed as to the particular power of the eyes, flight, &c. For instance, Rogers, that remarkably correct poet, says—

> "Hark! the bee winds her small but mellow horn,
> Blithe to salute the sunny smile of morn."

Well and good; but how are you going to get over the following?—

> "Who bids her soul with conscious triumph swell?
> With conscious truth retrace the mazy clue
> Of varied scents that charmed her as she flew."

According to the poet, just at the very time when the bee would be loaded and probably weary, it must begin to retrace "the mazy clue of varied scents" on its return journey, and would necessarily have to

follow the winding circling zig-zag course back to the hive. Goldsmith makes quite as great a blunder, when he tells us that the fresh-water gudgeon and eel have no air bladder. I happen to know they have: the gudgeon, a beauty. After all, it would appear that bees only fly in a direct line on their return to the hive. Apologising for taking up so much of your valuable space—*Mark Antony.*

MIGRATORY BIRDS AND THEIR OLD HAUNTS.—Mr. Taylor writes in a recent number of SCIENCE-GOSSIP, upon this subject; mentioning a cuckoo with a peculiar threefold note. While I do not wish to challenge his statement that the bird in question returned to its old haunt, I should like to point out that this particular note is no great rarity. Some years ago, I heard several cuckoos uttering it on the sand-hills near Wallasey, and a friend who lived in Liverpool wished to persuade me—whether in jest or earnest I know not—that the cuckoo with three notes was a distinct species peculiar to that locality. Since then I have heard the same note in various parts of the country, and am inclined to think, from personal observation, that it is oftener uttered after the bird has "changed his tune" than in the earlier part of the season.—*H. Snowden Ward, Ilkley.*

GREEK TORTOISE.—Mr. Mattieu Williams's note on the tortoise parasite reminds me of several I found on a Grecian tortoise (*Testudo Græca*) about two years ago. They were certainly not so large as the specimen he describes, but were hooked on their host in the same place, i.e. between the leg and abdomen, They are apparently a species of Amblyomma (Koch), the one in question being probably that to which Cuvier refers as "fastening upon various quadrupeds, and *even the tortoise*, burying its suckers so completely in its flesh that it can hardly be detached by force, or by tearing away the portion of skin to which it is fastened"—the accuracy of which I can confirm. Amongst others received from the Red Sea littoral, I have one which seems to be similar to that of Mr. Williams; but as to its host I have no information.—*Harry Moore.*

FERTILISATION OF PLANTS, ETC.—I was very pleased to see that your correspondent Mr. Robert Paulson had noticed that bees do not always enter the throat of the flower to extract the honey, or, rather, the juice which is eventually changed into that article. Three or four years ago I had a bed of broad beans, and every flower was pierced at the base. I have watched bees for hours at various times, and in some cases I have seen two, three, and even four bees break through the same flower at different places with their strong mandibles. I think this is a pretty good proof that the bee that last visited the flower had no knowledge of previous visits from other bees. Your correspondent thinks differently, I see. Can Mr. Paulson inform me if bees possess this intelligence when extracting honey in the ordinary way? There are several deeply interesting questions opened up by your correspondent which will take some answering, methinks. I must remind him that the great bee student, Huber, was well acquainted with the above facts.—*Mark Antony.*

A QUERY.—Supposing a bee extracted the honey from a scarlet-runner flower on August 1st, how long would the flower be before it was ready to be visited by another bee? From the very interesting remarks of Mr. Paulson, it would appear that the honey—if I may be allowed the expression—actually exists before the flowers have expanded. Does this remark apply to every flower? I was certainly under the impression that the juice of the flower intended to form the honey could not possibly be developed until the flower had expanded. But it appears I am wrong. The following remarks may interest Mr. Lett. In that delightful book, "Ants, Bees and Wasps," by Sir John Lubbock, p. 278, he says: "I have been a good deal surprised at the difficulty which bees experience in finding their way." At p. 275: On a beautiful June morning he took a bee which was just starting out, took it to his room, a distance of "only two hundred yards," gave it some honey, which it enjoyed. In a few minutes it flew away, but did not return. At the same page he says: "Indeed, I rarely found bees return to honey if brought any considerable distance at once." But he says—and this seems to me important—"By taking them, however, some twenty yards each time they came to the honey, I at length trained them to come to my room." On p. 284 he says: "Bees are much affected by light. . . . One evening, having to go down to the cellar, I lit a small covered lamp. A bee which was out came to it, and, flying round and round like a moth, followed me the whole of the way there." It seems to me impossible that a bee without any previous experience could take a flight of two miles in a straight line, and Sir John seems to be of the same opinion.—*Mark Antony.*

CYPRIS AND MELICERTA.—A few days ago, when I was looking in my microscope, where I have some pond-weed, to which are attached several rotifers of various ages, I saw a Cypris attack one of them, a full-grown *Melicerta ringens*. The Cypris at first seemed to be digging its claws into the bottom of the tube, as if to tear it from the leaf; then it climbed up and scratched one side for some time, then the other, about half-way down, until there was a large hole in it. It then went to the bottom of the tube, and whilst there the Melicerta came out at the top, and expanded its discs. The Cypris immediately climbed to the top, and the Melicerta as suddenly disappeared; and the Cypris, with its head down and its claws stretched out, began to scratch the middle of the tube again, until part of it broke off, leaving half the Melicerta exposed. The Cypris then left it, and a number of minute, round, transparent bodies appeared, which seemed to settle upon the Melicerta as it swayed backwards and forwards in its uncovered state. The next day the Melicerta was very lively, and was busy repairing its tube, as if nothing had happened.—*E. Roberts.*

EXPLODING GUNPOWDER.—I have been trying to explode gunpowder, etc., with the dark rays of the sun, excluding the light rays by smoked glass, also with glass painted with lampblack from a water-colour paint-box, but can get no heat at all. Can some reader inform me through your instructive paper how to proceed and to get the desired results? —*W. J. Paul.*

SPOTS ON SYCAMORE LEAVES.—Mr. Drummond seems to refer to spots which he has seen only on Sycamore leaves. If so, he probably means the black patches produced by a fungus, *Rhytisma acerinum* ("Handbook of British Fungi," p. 756). With the editor's permission, I will send sketches of this for the next number of SCIENCE-GOSSIP.—*W. B. Grove.*

VIBURNUM LANTANA AND VIBURNUM OPULUS.—The wayfaring-tree and the guelder rose. Our hedges and woods are bright with the berries of these shrubs. Have they any use? Are the former poisonous? I see Johns mentions that it is said the latter are sometimes fermented and eaten.—*H. L. Damfrier, Rochester.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

We request that all exchanges may be signed with name (or initials) and full address at the end.

G. R. Hyatt.—The objects you sent are the larva of the common drone-fly (*Eristalis tenax*), and one generally known as "rat-tailed maggots." The tail is telescopic, and is the breathing-organ. It makes a capital microscopic object.

D. Packer.—No communication from you has yet reached us.

T. Wineer.—Many thanks for the neatly-mounted specimen of parasite.

F. Beddoes.—You will find a series of capital articles on staining vegetable sections in the back vols. of Science-Gossip. The vols. of Cole's "Studies in Microscopical Science" contain some first-class pages on Vegetable histology, staining, etc. For a text-book, however, you cannot get a better book than the last edition of Sachs.

M. Rae.—The specimen is the marsh helleborine (*Epipactis palustris*).

F. Ramsbottom.—The objects sent are the bird's-nest fungus (*Cyathus striatus*). See Cooke's "British Fungi," vol. i., p. 409.

J. G.—The special number of Science-Gossip devoted to the British Hepaticæ is now, we believe, out of print. Apply to some good secondhand scientific bookseller for it.

E. C. Cottingham.—Your specimen is the hair worm (*Gordius aquaticus*). You will find a full account of its life-history in Science-Gossip for the year 1865, pp. 107 and 197.

S. Howarth (Sheffield).—The specimen is undoubtedly a species of bird tick, but we have not yet made out the species. We will reply later on.

W. R. Head (Chicago).—You may obtain fossil sponges from Mr. J. D. Russell, 78 Newgate Street, London, or Mr. Samuel Henson, 277 Strand, London.

EXCHANGES.

Vol. III. of "Postal Microscopical Society's Journal" in exchange for Old Red fish remains or good shells from same formation.—T. Sanderson, Wells Road, Malvern Wells.

Best mounted microscopic slides in exchange for lantern slides.—S. Harrison, Dalmain Road, Forest Hill, London, S.E.

Wanted, Foraminiferous material of every description and from any locality; also rare mounted specimens of Forams; will give other good slides.—Edward Halkyard, The Firs, Knutsford, Cheshire.

Wanted, "The Structure and Distribution of Coral Reefs," by Charles Darwin, or "The Expression of the Emotions in Man and Animals," ditto, in exchange for a perfectly new and clean copy of Darwin's "Origin of Species," 6th edition.—H. E., Constable's Tower, Dover, Kent.

What offers for "The Book of Days," by R. Chambers, edition of 1883, bound in half calf, quite new, price 30*s*., two volumes? Books in exchange.—H. E., Constable's Tower, Dover.

Offered, L. C., 8th ed., 192*b*, 251, 423, 424, 438, 443, 539, 539*b*, 540, 541, 541*b*, 541*c*, 549, 551, 749, 805, 914, 921, 924, 1098, 1100, 1105*b*, 1157, 1248, 1308, 1420 (Foreign), 1484, 1506, 1516, 1547, 1675, and 1764. Send lists to—A. E. Lomax, 56 Vauxhall Road, Liverpool.

What offers for "Ure's Dictionary of Arts, Manufactures, and Mines," by Robert Hunt, F.R.S., 7th ed., 4 volumes, half-bound in Russia leather; clean, and in perfect order.—C. W. Harding, The Chase, King's Lynn.

Good series of British shells wanted for a small public museum; also many of the rare and local species. *Limnæa peregra*, monst. *sinistrorsum*, etc., offered in exchange.—Sydney C. Cockerell, 5 Priory Road, Bedford Park, Chiswick, W.

Micro fungi and micro slides for exchange. Lists on application to—Rev. Hilderic Friend, F.L.S., Worksop, Notts.

Wanted, materials for the study of fossil flora, carboniferous and other. State desiderata.—H. Friend.

British marine shells offered in exchange for land and fresh-water shells. Specimens must be best of their kind.—Mr. Marshall, Sevenoaks, Torquay.

Foreign butterflies: *Orn. Brookiana* (Borneo), *Morpho Cypris* (Bogota), *Urania rhyphæus* (Madagascar), the three most beautiful butterflies known; also the rare and lovely *Morpho alga*, and many other duplicates.—Hudson, Railway Terrace, Cross Lane, Manchester.

Wanted, to exchange good herbarium specimens of United States plants for specimens from England or Europe generally. Only complete specimens desired, no fragments. References exchanged.—F. T. Aschman, Sharon, Penn., U.S.A.

Wanted, larvæ of ant lion (Myrmelion), unmounted. Will give in exchange green weevils (*P. uniformis*) or others.—Mark L. Sykes, Adelphi Street, Salford.

Good plants of greenhouse exotic ferns, cacti, and other flowering plants, in exchange for the "Dictionary of Needlework," Beattie's "Abbeys and Castles of England and Wales," good pathological slides, or foreign shells.—E. R. F., 82 Abbey Street, Faversham.

Store boxes wanted in exchange for shells or books. State dimensions, materials, and number.—Mr. Marshall, Sevenoaks, Torquay.

Wanted, Dr. Taylor's "Our Common British Fossils and Where to Find Them," in exchange for Lowe's "British Grasses," beautifully illustrated and in splendid condition.—O. Rees, 59 Sandbrook Road, Stoke Newington, London, N.

Wanted, some British birds, skins or in flesh. Offered in exchange, natural history books. Lists exchanged.—J. H. K., 18 Church Street, Commercial Street, E.

Choice Lias fossils, including *Eryon barroviensis*; exchange for natural history or scientific books.—H. E. Quilter, 4 Cedar Road, Leicester.

Scottish mosses and hepatics, chiefly Alpine, in exchange for English and Irish species.—Alex. P. Lowson, 72 Keptie Street, Arbroath, N.B.

Well-mounted microscopic slides for anatomical or pathological tissue, either fresh or hardened.—Thomas Groves, Kilburn Dispensary, N.W.

Good specimens of *Erica ciliaris* (many), *Linaria repens*, *Antirrhinum orontium*, *Scrophularia scorodonia* (2), all collected and pressed this summer, in exchange for following in London Catalogue, 8th edition: Nos. 6, 11, 23, 28, 33, 39, 40, 41, 45, 46, 160, 161, 162, 180, 191, 208, 271, 295, 374, 402, 403, etc.—T. J. Porter, Perranarworthal, Cornwall.

Over 200 species of British wild plants, many very rare: what offers? Wanted, Nos. 834, 1042, 1347; offered, Nos. 150, 1008, 1334, and others. Lists exchanged.—A. C. O., 7 Cavendish Terrace, Torquay.

"Journal of Conchology" for the years 1883 and 1884. What offers?—B. M. O., 7 Cavendish Terrace, Torquay.

Wanted, to correspond with Colonial or foreign collectors with a view to the exchange of shells.—C. L. S., 8 Trinity Street, Hastings, England.

Wanted, perfect microscope stand bin or monocular, Crouch or other good maker. State exchange.—A. B., 115 Camden Road, Tunbridge Wells.

Wanted, back numbers of "The Journal of Conchology"; will give in exchange Jobert's "Philosophy of Geology" in English and French, gilt edges (10*s*. 6*d*.), microscopical slides; coleoptera, etc.—W. E. Collinge, Springfield Place, Leeds.

BOOKS, ETC., RECEIVED.

"Monograph of the Brachiopoda and Lamellibranchiata of the Rawilau Clays and Greensand Marls of New Jersey," by Robt. P. Whitehead (Washington: Government Printing Office).—"Catalogue of the Blastoidea of the British Museum," by Robert Etheridge, jun., and P. H. Carpenter, D.Sc. (London: British Museum Trustees).—"Pond Life," by A. Butler, B.Sc. (London: Swan Sonnenschein & Co.).—"Cole's Studies in Microscopical Science."—"Journal of Royal Microscopical Society."—"Journal of Quekett Microscopical Club."—"Transactions of Chichester and West Sussex Natural History Society."—"Proceedings of American Academy."—"The Amateur Photographer."—"The Camera."—"The Scientific Enquirer."—"The Hoosier Naturalist."—"The Garner."—"The Naturalist."—"The Botanical Gazette."—"Journal of the New York Microscopical Society."—"Journal of Conchology."—"Journal of Trenton Nat. Hist. Soc."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

Communications received up to the 13th ult. from: S. H.—S. A. L.—E. W.—A. E. F.—W. H.—J. J. M.—J. W. E.—F. B.—C. A.—G. B.—G. R. H.—S. H.—T. S.—R. A. R. B.—M. A.—J. G.—H.—S. C.—E. R. F.—M. L. S.—E. S.—J. H.—F. D.—C. W. H.—W. B.—H. E.—H. L. D.—R. F. L.—F. F. A.—G. W. Hall.—J. L. M.—W. B. G.—A. E. L.—C. R.—W. B. D.—H. D. O. F.—J. H. K.—J. G.—W. D.—H. P. A.—A. P. L.—C. R.—H. E.—P. Q. K.—J. W. N.—H. E. Q.—A. B.—W. J. N.—O. R.—G. C. G.—F. H. A.—J. H. K.—J. B.—C. D. B.—C. L. S.—W. J. N.—B. M. O.—W. E. C.—F. J. G.—W. M.—&c., &c.

NOTES ON "ERICA CILIARIS," L.

By T. J. PORTER.

A SHORT description of this lovely but local Heath may be interesting to some of the readers of Science-Gossip. The Cornish locality of Ciliaris is given by Professor Babington as Edgecumbe Downs, near Carclew, but it is not confined to Carclew, two or three scattered plants being met with, during the past month, at least two miles away. Carclew is a fine old country seat, situated about half-way between Falmouth and Truro, and Ciliaris grows in the greatest profusion about a mile from the house. Some of my friends may reprove me for thus exactly pointing out its Cornish home, but I have done it with a purpose. The woods in which the heath grows are swarming with pheasants, and Colonel Tremayne, the owner of Carclew, although always very glad to give permission to *bonâ fide* botanists who wish to see it, or to fill a gap in their herbarium, very naturally objects to trotting tourists invading his game preserves, and carrying away bundles of the heath. *Verb. sap.*

The heath is most abundant in a plantation of scattered firs. A rough mechanical analysis of the soil shows it to be at least 70 per cent. sand. Here, covering many acres, Ciliaris grows in all its glory. Tetralix is met with, but is comparatively rare. Cinerea is of course abundant, but less so than Ciliaris.

Many struggling stems come from one root, and they are often from four to six feet long and nearly as tough as those of Calluna. The leaves on the main stem are four in a whorl, and on the shorter barren branches three in a whorl. They are ovate, with revolute edges, hoary beneath, with a dark line where the midrib lies, and light green above; their direction is generally forwards. Further, they are ciliated, as the name implies, and the hairs appear to be tipped with viscid matter, which may be drawn out into fine threads like cobweb. The sepals are still more viscid, and two racemes will stick together somewhat firmly if placed back to back. What is the use of these viscid drops?

In detail. The flower-stalks are from $\frac{2}{16}$ to $\frac{3}{16}$ of an inch long; the sepals are ciliated, and have two whitish scales lying upon them. The corolla is from $\frac{5}{16}$ to $\frac{8}{16}$ of an inch in length, and is of a bright purple. The mouth of the corolla is oblique; its upper edge overhangs the lower. The anther is not spurred as in Tetralix, and is of a brownish-purple. The style is protruded, extending quite $\frac{1}{16}$ of an inch beyond the upper rim of the corolla.

The flower is, botanically speaking, a terminal unilateral raceme. One side of the stalk is always clear of flowers, which always spring from a leaf-whorl. The flowers all point forwards, and are most frequently in threes or fours: as they fade, however, they turn backward almost far enough to touch. I have counted the flowers on a great many stalks, and I find that those which first bloomed bore the greatest number of flowers. The difference is marked, and is probably owing to the gradual exhaustion of the vital powers of the plant. Thus, on September 27th, I carefully examined several racemes with this result: the numbers on those then in bloom were 11, 4, 24, 6, 8, 14, 17; while the dead or dying ones, which remain long on the stalks, were 45, 41, 48, 31, 29, 27, 35, and 38. Ciliaris is in bloom from the end of July to the end of October.

Perrawarworthal, Cornwall.

After the completion of the present volume of the "Natural History Teacher," it is announced that the title will be changed to that of the "Economic Naturalist."

THE WINGS OF BIRDS.

By J. LANCASTER.

[*Continued from p.* 224.]

LET us now attend to a matter of simple experiment, which demonstrates bird flight, as I have presented it in the "American Naturalist," and which connects the above described construction of a wing, which is the organ of flight, with the mechanical forces which operate upon it. A few cents' worth of material and the expenditure of a little time is required, which, coupled with a minimum of mechanical expertness, will suffice. The movement following changes made in the plane are so prompt and emphatic that there is no mistaking them.

If we take a sheet of light strong paper, such as goes into construction of fireworks, and stretch sixteen by forty inches of it tightly on thin strips of bamboo, so as to present a plane surface on one side, and fasten a four-ounce weight in the centre beneath by threads to the four corners, we shall have a miniature parachute. By putting its upper surface against the ceiling, and permitting it to fall, it will descend vertically, if we have it well balanced. It is obvious that the entire column of air, from the ceiling to the floor, is moved out of the place it occupied by the fall of the plane upon it. It is evident that the pressure of the plane against the air is greatest in the centre, diminishing to the edges where it is nothing. Hence the zone of air under the plane acted upon by it, would be pyramid-shaped with a base sixteen by forty inches, a top line twenty-four inches long and a height varying with the velocity of the fall of the plane, with the apex pointing downwards, and there would be a steady flow or slipping of the compressed air along the surface in all directions from the centre. This slipping would cause friction on the surface, which being alike on all directions, no lateral motion would occur. If we now take some large-grained, light sawdust and mucilage, and thinly sprinkle one-half of the under-surface from one of the long edges to the centre, the level plane will no longer fall vertically, but more towards the edge bounding the sawdusted half. If we extend the paper an inch over the edge opposite the sawdust and sink it into the bamboo, so that it will curve upwards, we shall find on dropping the plane that its motion sideways will be augmented. If we paste a slip of paper to the front edge, allowing it to project one inch and a half beneath, we shall find the motion sideways to be further increased so as to be many times that of the fall. If we take the plane to the house top, when the air is calm, and allow it to drop, it will describe a curve while it is being accelerated, but on uniform motion occurring it will slant downwards very gently and move laterally from six to eight times as fast as it falls vertically. This experiment is very delicate, and the motion varies greatly, depending on the weight and humidity of the air and the construction of the plane. The cause of this behaviour is obvious. The air is rushing along the under side of the plane to escape, drags the rough surface with it to the front, slipping over the smooth part to the rear easily. Then as it turns the curve it expands against it, augmenting the front thrust. Where the air escaping towards the front meets the ledge, a complete stoppage occurs, and the thrust against it is quite violent. The ledge in front of the roughened half of the surface, and the rear curve, all tend to throw the plane edgeways in the same direction while it falls—the ledge by directly stopping the motion of the rushing air, the rough surface by frictional resistance, and the curve by presenting a base for the compressed air to expand against. The force required to produce these various results is put into the air by the descent of the plane upon it under the impulse of the gravity of its mass. The wing of a bird would act in the same way that the plane acts, and for the same reason. The elastic feather tips give the curve. The construction of the feather surfaces gives the smooth rear, and rough front part; the feather surfaces give the smooth rear, and rough front part; and the front projection of the integument covering the bones forms the ledge.

Why is it that the plane moves so much faster edgeways when it falls? Obviously because the condensed air in contact with the surface moves with far higher velocity than the fall, carrying the plane with it. The inertia of the air resists sudden motion, so that the particles are compressed before they begin to move, and when motion at length occurs, it is sufficiently rapid to make up for lost time. A non-elastic fluid would not present this rapid motion on the compressing surfaces. If we increase the pendent weight and take the plane to the lantern of a light-house, or very high building, we shall find that its lateral motion will be greater, and every addition of weight will heighten the lateral velocity in a greater ratio than the fall. The reason is that the plane meets with small resistance to its motion edgeways, so that a slight increase of force in this direction moves it rapidly. But, however great this motion may be, however closely it may approach level translation, by no means could it become horizontal as long as the plane itself was level. The entire force producing lateral motion comes from motion in the direction of gravity down the vertical, and horizontal translation would stop the fall, thus cutting off the motive power. But if we slant the plane the vertical goes over with it. Its own activity determines the direction of its vertical, it is fluid pressures we are dealing with, and what would be level translation on our horizontal is a constant fall from the bird's horizontal; and a soaring bird certainly needs no further explanation, neither does a wild duck. It is not heavy enough, relatively to the size of its wings, to reach a uniform velocity of fall which would produce the thrust needed in the lateral motion, and resort to flapping is compelled to aid the normal

component of gravity. The wing now comes down with velocity sufficient to give the thrust required for horizontal flight. But both soaring and flapping would be impotent without the resolution of the direction of gravity.

The moment the plane is inclined, it becomes necessary to counteract the component of resolved gravity acting in it, on the downward slant; and this component carries the plane with it during acceleration to the ground before uniform motion occurs. The application of external force to the plane, reversing its motion, is attended with difficulty on account of rapidity of its movements and the inertia of the pendent weight. All the impulses must be steady, jolting motion being fatal to success. Care must be taken in carrying our experience of velocity derived from other things into this region. It is not likely that a vigorous man could move his limbs at a higher speed than thirty-five feet per second for a short time at his utmost exertion. These planes greatly exceed this velocity in the lateral motion, the soaring birds moving at times at the rate of 150 feet per second.

Motion of the planes, therefore, is best derived from their own activities. This can readily be obtained in still air by using fine shot for the weight in oil-silk bag, with a thin neck opening into another placed lower down, and fastened to the corners of the plane by separate strings. The neck should be made to allow two pounds of shot to flow through it in about ten seconds; as the shot reached the lower bag, the plane would be slanting by drawing on the longer front and shorter rear strings.

With 150 feet fall, this construction will give motion under the resolution beautifully. Nothing can exceed the graceful curvature of its movements, excepting similar ones made by the soaring birds. As acceleration passes into uniformity, and the total force is expended in the work on air, as the shifting balance inclines the plane transforming the vertical, ample force is on hand in the condensation to resist the downward slanting impulse. If the adjustment is correct, holding the plane on the right incline, horizontal motion will occur until it passes out of sight. More inclination will cause upward slanting direction. If the incline be so great as to throw too much of the resolved gravity into the plane for the forward thrust to cope with, speed will slacken and finally motion to the front will cease and be reversed on the downward slant backwards, and the frail machine become a wreck in an instant by violently striking the earth. I have floated these planes from the lantern of Egment light at the entrance of Tampa bay, on the Gulf coast of Florida, when the air was so still that a handful of down from the breast of a pelican, thrown from the top, would quietly sink along the shaft to the ground.

To one who is familiar with the soaring birds, and has made a study of their habits, these floating planes present little that is interesting. They imperfectly imitate the bird, and do nothing that the birds cannot do better. The latter present a plane with automatic balance as well as a self-acting steering apparatus, and are so plentiful that they can be studied at any time. But the planes serve to explain the wing admirably, and after witnessing their performances with none, and either, and all of the contrivances for producing forward thrust, but little more need be said or done explanatory of their functions.

From the fore-leg of a reptile to this wing is doubtless a long step, it must needs be. The reptile passes life in the midst of solid, non-elastic resistances; the bird lives a divided life, part of which is under the dominion of other laws. It copes with fluid elastic pressures when it navigates the air, and nature has transformed the creature to meet the changed conditions of its existence. One pair of legs is retained to treat with forces under the dominion of laws which operate in the reptile world in common with man's world where motions are deliberate, impediments plenty, clashing activities found on all sides and the area of translation confined to two dimensions only. The other pair are changed to suit a very different world, where the sea is a hill-side, vertical lines variable, the plane of the horizon perpetually changing, impediments non-existing, velocities high, and the third dimension added to the area of translation. With the organ of flight understood, and the resolving power of planes working on air under the law of fluid pressure comprehended, there would seem to be no further impediment to the application of the axioms of mechanical science to the problem of air navigation.—*American Naturalist.*

MY DRAWING-ROOM PETS.

By Clara Kingsford.

Part I.

SAURIAN REPTILES.—What strange creatures for pets! No doubt some of my readers will think. And so I should have thought at one time, if I had given them a thought, and no doubt should have thought so for ever and aye, had not my father caught a lizard, whilst it was rapidly gliding across our yard and making for our back door, one bright July morning in 1880.

To have attempted a capture by the hand would have been an egregious mistake, for if so caught a lizard is not likely to be retained, for it will usually slip through the fingers, leaving its tail (which is not prehensile and will snap like glass) wriggling in the hand, whilst the body is to be seen quickly retreating into some place of safety. It is said that the tail when broken will grow again, but will never attain to the same length or perfection as the original one; naturally it will grow if the lizard is young and growing, but I doubt if it will do so in an adult specimen.

For nine long months, how anxiously I watched the amputated tail of one of my full-grown pets, in the illusory hope of seeing it gradually elongate, only to be disappointed. My pet Tommy's pride and beauty had departed, and for ever.

My father being intent on effecting the capture (with safety to tail and limb) of the unexpected prize, which chance, as we erroneously say, offered him, held a dustpan before the little Saurian into which he ran, and then placed a soft long-haired brush over him, and in this way he was conveyed triumphantly into the house. Strangely beautiful was our little captive, and I found on enquiry that he was a young male specimen of one of our two true British lizards, the common little brown lizard (*Zootoca vivipara*) measuring about four inches. He grew during the first and second year of his captivity, at the end of which time he stopped short by half-an-inch of the average length of the *Z. vivipara*—six inches. His caudal appendage, which was longer than his body, tapered off to the finest point; the colour of the upper part of his body was olive-brown, which, in the sun, had a metallic-green hue, and sometimes was even iridescent, with a dark brown and interrupted line "down the middle of his back, and a broad longitudinal band down each side, between which and the middle line were black dashes and ocellated spots; in some specimens of this lizard the spots are pale orange. The under part was of a fine orange, spotted with black; if a female, it would have been pale olive-grey. The colour and markings of this lizard are subject to variations. There was quite an appreciable

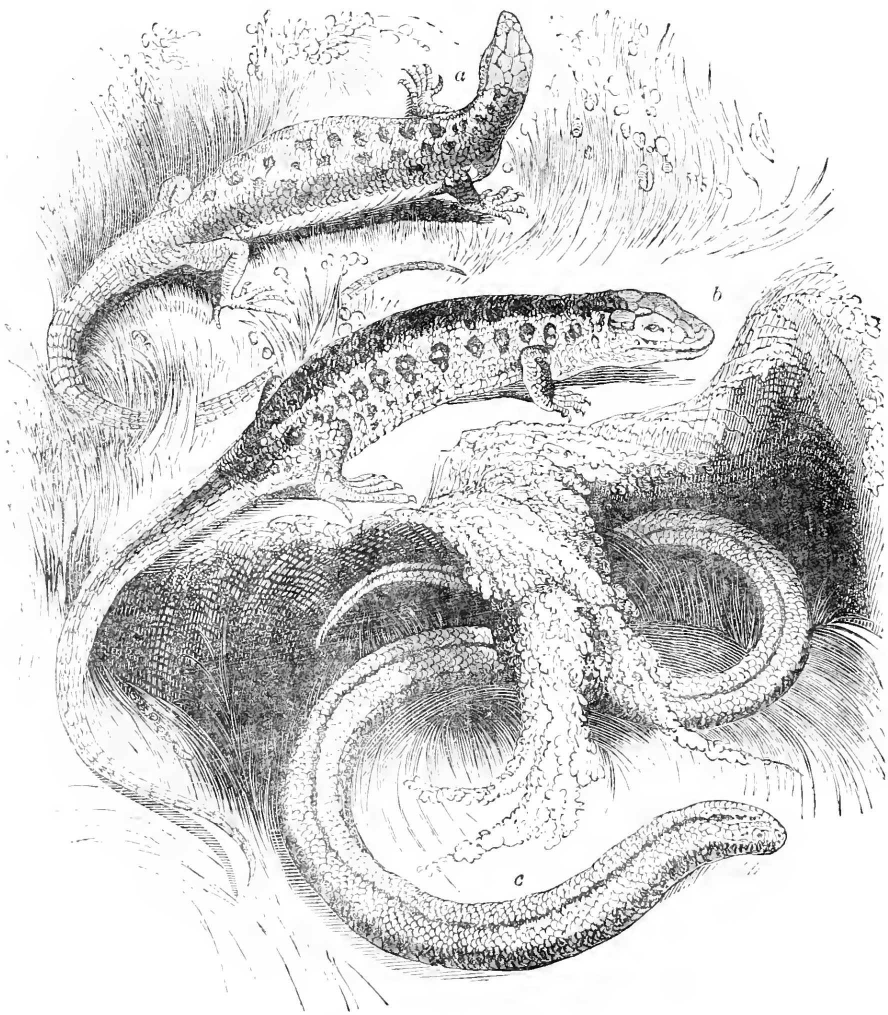


Fig. 153.—Group of Lizards. *a*, Viviparous Lizard; *b*, Sand Lizard; *c*, Blind Worm.

difference, (in colour especially) between the several specimens that I have had under my care, and as each came from a different locality, the most feasible solution of the variations is soil and climate.

I named my little lacertian, "Tommy," after his proud captor.

A fish-globe served him for a permanent home, which I thickly garnished with sand, then placed in it a tuft of grass, a large stone (for the lizard loves to lie under the latter), and a saucer of water.

On bright sunny mornings Tommy was to be seen basking in the sun, stretched out full length and looking so broad and flat. How his dark bright eye would follow me about, and if I failed in providing him the required pabulum, he would become very demonstrative; would rise and crawl about with his

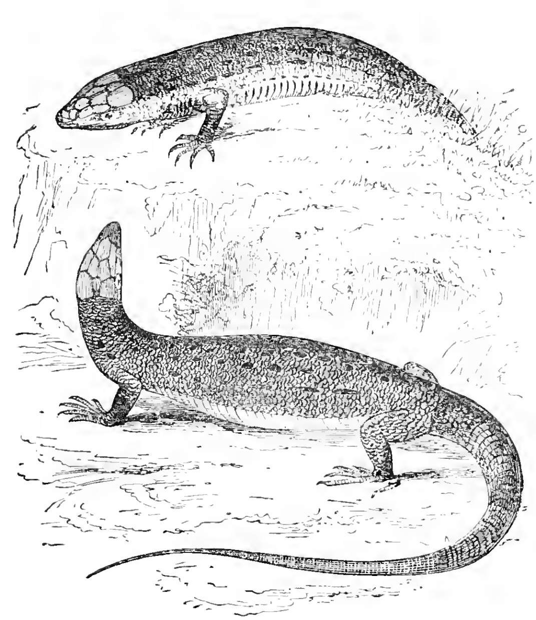


Fig. 154.—Viviparous Lizards (*Zootoca vivipara*).

nose down, his face increasing with his disappointment; on finding nought, he would raise his anterior legs, as on tiptoe, hold up his head, at the same time opening his mouth so wide and looking at me so appealingly, yet when I answered his appeal with insect food, he would not catch it whilst I looked on. He appeared too intent on watching me. However, on my retiring to a little distance behind him, he would immediately plant his posterior limbs firmly down, raise his anterior ones, and stretch forward his neck, and in this attitude he would watch his prey until it was nearly out of reach, when he would suddenly dart forward and catch it in his mouth, immediately shake it, and, if a fly, gradually turn it round until the head pointed towards his throat. The reason why the lizard adopts this method of swallowing a fly is very apparent, for, as the luckless insect is being swallowed, its wings gradually fold over its back, thereby preventing any inconvenience from the protruding of its wings on either side of the reptile's mouth. A caterpillar or meal-worm was always seized in the middle, well shaken whilst it was being munched and squeezed, and gradually turned round, until, as in the case of the fly, the head pointed towards the throat. A spider, on the contrary, was swallowed the reverse way, with a view of detaching, if possible, the body from its head and legs. Whilst munching and squeezing its prey, the lizard continually rubs first one side of its jaw and then the other on something hard, with the view of furthering the detaching of legs or wings, or any portion of its prey which it does not desire to swallow.

Spiders and insects must have wonderful vitality, for, upon several occasions, I have seen an individual—either of the class Arachnidæ or Insecta, wholly hidden and munched in Tommy's mouth for a much longer time, and in such a manner, as I should have thought would have precluded any chance of future activity on its part—make its escape apparently totally unharmed from the jaws of death, and run or fly off as the case might be.

GOSSIP ON CURRENT TOPICS.

By W. Mattieu Williams, F.R.A.S., F.C.S.

Underground Waters.—The Report of the Committee of Enquiry into this subject which was read by Mr. C. E. De Rance to the British Association has considerable practical, as well as scientific, interest. The more we study the subject of river pollution, and the question of domestic water supply, the more and more evident becomes the danger of depending on the rivers of our thickly-peopled country. This report, and the previous labours of Mr. De Rance, who has so industriously and skilfully applied himself to this subject during many years, prove that we have under our feet an abundance of naturally filtered water which we may obtain and use on one condition; viz. that those who seek for it understand the subject. A man may be a very eminent engineer and yet be quite ignorant on this matter. The engineer employed to sink for water, however eminent, requires to know which are the water-bearing strata, where they exist, and how to tap them. Making a deep hole in the backyard of a brewery is not sufficient. Mr. de Rance and his committee have shown, that the strata of this country absorb from one to twelve inches of rainfall annually, and that every inch thus absorbed supplies 40,000 gallons daily to every square mile; thus the actual underground flow varies from 40,000 to 480,000 gallons per day to every square mile.

This flow does not occur at random; the water selects the most porous and the most accessible rocks

of the district, and follows their course downwards. It is not so obliging as to rush into a particular hole that may be bored in a convenient part of a particular London brewer's particular premises. Hence the failure at Meux's brewery; which so many regard as proving the impossibility of supplying London from below. Mere sinking of wells in the chalk is but a foolish proceeding. Unless the sinking happens by accident to strike a fissure, only a dribbling infiltration through the sides of the well occurs. The proper course of proceeding is to first ascertain the prevailing direction of the fissures in the chalk, then to sink a shaft into it, and from this to drive an adit or tunnel at right angles to the course of the fissures. This has been done at Brighton where, by means of the Goldstone tunnel, a continuous supply of $5\frac{1}{2}$ millions of gallons are obtained daily; two millions more than the town can use. At Birmingham, where the water-bearing rock is totally different, and therefore demands different treatment, nine millions of gallons are obtained daily from suburban wells: 3,000,000 from Aston; 2,500,000 from Witton; 250,000 from King's Vale; 2,000,000 from Perry; and 1,250,000 from Selly Oak.

Telegraphic Invasion.—A remarkable illustration of the penetrating power of Science is supplied by the fact that Seoul, the capital of Corea, is now in telegraphic communication with Pekin and the rest of the world. Six years ago any European who ventured to visit Corea did so at the risk of his life, all such intercourse with the outer barbaric world being prohibited. Now, as "Nature" says, "a merchant in London might telegraph direct to the Hermit Kingdom."

Hydrogenium.—The experiment of dipping a knife blade into a solution of a salt of copper, and thereby coating it with a film of metallic copper, is very familiar, and is very instructive, because it is a typical example of a widely extending chemical law, that if we take two metals, varying materially in their affinity for oxygen, and expose that which has the stronger affinity for oxygen (the electro-positive metal), to a solution of the electro-negative metal, or that having the weaker affinity for oxygen, a precipitation of the latter in the metallic state from the solution will take place.

Hydrogen, although a gas under ordinary terrestrial conditions, is a metal as regards its chemical relations. Certain metals may be made to absorb or occlude vast quantities of hydrogen gas; this is especially the case with palladium, which may be made to take up more than 600 times its own bulk of hydrogen, and become altered in its properties thereby, the alteration corresponding to that which occurs when one metal is alloyed by admixture with another metal. The hydrogen becomes a solid when thus occluded or alloyed, and this solid has been named *hydrogenium*, in accordance with the established custom of using the termination *um* to indicate the metallic condition. The theory of the metallic character of this hydrogenium requires it to be an intensely electro-positive metal, and therefore that it shall precipitate the relatively electro-negative metals from their solutions. Schwarzenbach and Kritschowsky have recently proved this to be the case. They saturate strips or wires of palladium with hydrogen, then dip them into solutions of different metals. The saturated palladium becomes plated with the metal in solution, although previous to its saturation no such precipitation or plating occurs. This difference is attributed to the highly electro-positive metal hydrogenium.

The African Mediterranean.—One of the grand projects of M. de Lesseps was to cut through a strip of land, the Seuil de Gabes, or Khabs, or Cabes, lat. 34° N., long. 10° E., at the bottom of a bay or gulf of that name (or rather all those names), and thus let the sea into that depression of the Desert of Sahara indicated by numerous lakes or "shotts," such as Shott el Melah, Shott Melrhir, Alsibkar, &c. These lakes are fed by rivers which flow into them and are lost. The evaporation from the surface of the lake, and the sinking into the sands, is equal to the supply of water brought down by the rivers. Only thirty or forty miles of cutting through the above-named strip is required to let the sea into the salt lake of Alsibkar, and therefrom to spread it throughout the whole region. This cutting, according to a report presented about five years ago by Colonel Roudaire to the Minister of Public Instruction, would present no difficulty, the material being clay, marl, sand, and chalk.

The area of desert and salt lakes lying below the level of the Mediterranean, and therefore included in the flooding, was variously estimated from equal to that of Ireland to something much more than that of France. The area of Sahara altogether is about thirty-five times that of England and Wales. The desirability of converting a considerable portion of this desert area into a lake is obvious. Not only would an extensive coast-line be created, freely communicating with the outer world, but the climate would be materially altered, and the deep sandy soil resting on rock below would be watered by an underground extension of the visible lake.

Colonel Roudaire is dead, and in a communication to the Academy of Sciences, at its sitting on the 2nd of August last, M. de Lesseps states that the project of creating an inland sea has been abandoned, and that attention is now devoted to the Wed Melah basin, which it is hoped may be restored to its former fertility by sinking artesian wells.

A New Vapour Engine.—M. Tellier has submitted to the Academy of Sciences an ingenious

substitute for the steam-engine. Instead of using water, with its boiling-point of 212°, as a source of vapour, he uses a volatile liquid which is convertible into elastic vapour at a temperature easily obtained by solar radiation, or at the ordinary temperature of the air in summer. The engine is to be used for raising water from wells where the water itself is cool enough to condense this vapour. It is thus described in "Iron:"—"The roof of a shed or small building is made of tight compartments formed of iron plates, which are rivetted at their edges. In each of the compartments a volatile liquid is enclosed, which becomes vapourized by the atmospheric heat, the vapours escaping by tubes which meet in a common reservoir. Whatever liquid is drawn with the gas, returns to the compartments by a lower tube. The vapour passes from the reservoir to a metallic sphere at the bottom of the well. This sphere has a caoutchouc diaphragm which can be fitted by its elasticity alternately to the upper or lower hemisphere, so as to move a sliding valve, and by the alternate introduction and condensation of the vapour to raise water in considerable quantities." In actual working, a machine of this kind raised 260 gallons of water per hour from a depth of twenty-three feet.

The Re-afforesting of London.—This subject has been much discussed in some of the papers lately. All agree in its desirability, but many despair of the possibility of carrying it out. It is feared that the trees in the proposed public avenues, and those privately planted in back yards, will not survive the London atmosphere. They certainly will not, if planted without selection and discrimination. There is one tree which has proved itself to be the Cockney of the vegetable world, as it thrives in London as well as, or even better than, anywhere else. Other trees are suffocated by the particles of solid grime and the coal-tar vapours that are so liberally diffused in our London atmosphere. The plane survives this by the continual peeling of its bark. This peeling is visible to everybody in passing; the patches of new green cuticle on the trunk and branches, and the old exuvial bark lying at the foot of the tree, make it thus obvious. I have examined these trees minutely, and find a similar exfoliation extending to the fine twigs, and suspect that even the leaves do something of the kind, sufficiently to prevent the clogging of their stomata. A walk through the parks and squares affords an interesting study of this subject. The elms, the oaks, the conifera, and every other tree show signs of premature decrepitude more or less marked (less in the limes), while the plane flourishes luxuriantly, no matter how near to reeking chimney-pots. Therefore plant the plane at once, and in the meantime let our official botanists at Kew, etc., look out for other trees with similar self-cleansing properties and test them accordingly. If they ask for a locality where the trial shall be desperately severe, I reply, The Wicker, Snig Hill, Saville Street, and Carlisle Street, Sheffield.

Drying up of Lakes.—It appears from the Proceedings of the Geographical Society of St. Petersburg, that some of the great lakes in the Aral-Caspian region, especially those lying between Omsk and Tomsk, or between the Aral and the Obi, are rapidly drying. There is a group of three large lakes, Chani, Soomwi, and Abychkan, with a smaller lake, Moloki, between. The largest, Lake Chani, has diminished considerably, and still greater changes have occurred in the other lakes since reliable maps have been made. Villages now occupy part of the former site of Lake Moloki, which has contracted to less than a fourth of its former dimensions during the present century. Lake Abychkan has been reduced in the same period from an area of 530 square miles to three ponds, the largest being hardly a mile and a half wide. Twenty-five years ago there were several lakes, about ten miles long and eight wide, where there are now only small ponds. Lake Tchebakly, which in a map made in 1784 was shown as an oval forty miles long and thirty wide, is shown in a map of the beginning of this century as an irregular lake still forty miles long, but reduced to a width of seven to twenty miles, with several smaller lakes indicating its former dimensions. Thirty years later the whole was reduced to a few small lakes, the largest about three miles in length and width, and now all that remains of a lake which a hundred years ago had an area of 350 square miles are three ponds. If we could go further back to still earlier maps, we should doubtless find an inland sea, another Aral or Caspian, occupying the site of all these lakes and a considerable distance around. Lacking the maps we have geological evidence quite as reliable, though not so striking.

Centenarians.—The cases of Sir Moses Montefiore and Chevreul have refuted the scepticism concerning the existence of centenarians which had lately come into fashion. It was easy to deny the claims of the rustic patriarch, but those of two men who have been before the world with so much distinction cannot be set aside. Many other instances, recently assumed to be fictitious, are now regarded very differently. I do not go so far as to claim implicit reliance on the assertions of the Irish Countess of Desmond, second wife of the 12th Earl of Desmond, and married to him in 1530. She was seen by Sir Walter Raleigh in 1589, having already presented herself to the English court claiming the age of 140. She came to an untimely end in 1604 by falling from a high branch of a cherry-tree planted by Sir Walter Raleigh. According to the family traditions she was 162 years of age, and had recently cut her third set of teeth. The cherry-tree was introduced to Britain by Sir Walter Raleigh, and that which the old lady was climbing so skittishly was one of his first plantings

in the grounds of Dromana House, near Villierstown, in the beautiful valley of the Blackwater.

In connection with the tenacious vitality of Chevreul, it is interesting to note that his mother reached the age of ninety-three, and his father died when ninety-one. In most of the well-authenticated cases of long life, it is proved to be common in the family. If this is really a general law, natural selection will increase the average duration of human life as, *cæteris paribus*, those who live the longest will have the largest families.

ELECTRICAL ABSURDITIES.—A patent has been obtained for a galvanic plant invigorator and oxygeniser. Two plates or plugs are inserted in the earth on opposite sides of the plant, and connected by a wire. We are told that where the plant is watered "a gentle current of electricity" is produced, which decomposes the water into oxygen and hydrogen, "the former being liberated for the use of the plant." Of the gentleness of the current under such conditions there can be no doubt, but the most rudimentary knowledge of electricity would have taught the inventor that such a current cannot decompose water and liberate the gases as stated. Even if the current were strong enough, the liberation of gases would occur only on the surfaces of the plates.

Another electrical story comes from Germany, telling us that plates of copper were thrust upright in the earth and connected by wires with similarly placed zinc plates, about one hundred feet distant, an electric battery being thus formed, the earth between the copper and zinc completing the circuit. This is said to increase the yield of beets planted between the plates, 15 per cent., and potatoes, 25 per cent.

Such results revive the papers read at the Royal Society (March 1st, 1880), and at the British Association, 1881, by the late Sir C. W. Siemens, in which is described some very marvellous vegetation obtained by using the electric light in a conservatory. The "Times," and some of our popular scientific journals, took up the subject very sensationally, and informed the British public that "it is not unlikely that before many years have come and gone the label 'grown under the electric light' will be a familiar object in Covent Garden Market, attached not only to grapes, peaches, pine-apples and other kinds of fruit, but also to forced beans, lettuces, tomatoes and other vegetables." Not only have these anticipations failed, but the subsequent well-conducted experiments of M. Déhérain (Annales Agronomiques, vol. vii. pp. 551–575) have cruelly refuted the more responsible statements of Siemens.

MR. JAMES KENNEDY, the eminent Lancashire mechanical engineer, has just died at the age of eighty-nine.

THE TWO MIRRORS.

By W. J. N.

No. II.

WE begin with the PLANE MIRROR, as its properties are simple and easily understood. Let A B (Fig. 155) represent the section of a plane mirror. Let L D be a ray of light falling upon t

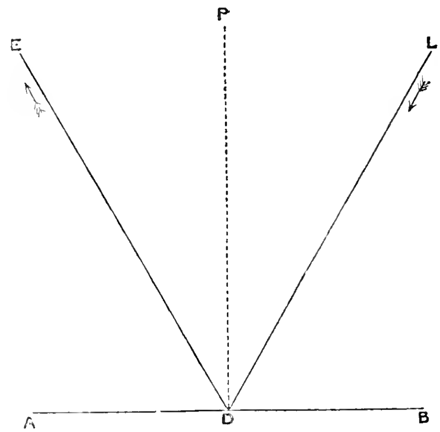


Fig. 155.

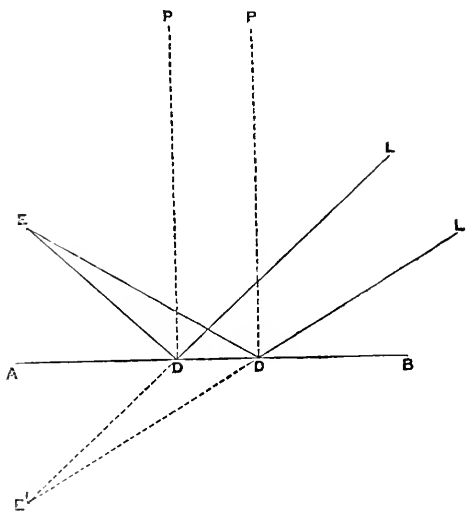


Fig. 156.

mirror at the point D, D E be the direction taken by the ray after reflection, and P D be a perpendicular to the surface of the mirror at D, the point of incidence. The angle L D P is called the angle of incidence, and P D E the angle of reflection. These two angles are always equal, the one to the other; and the incident and reflected rays are in the same plane, which is perpendicular to the surface of the mirror.

If two or more parallel rays fall on such a mirror, it follows that they will continue parallel after reflection.

If two or more convergent or divergent rays fall upon such a mirror, they will continue to converge, or to diverge, after reflection, just as if their lines of direction had not been altered. Thus, in Fig. 156 the converging rays L L continue to converge after reflection precisely as they did before it, and come to a focus at the point E. Had their direction not been changed, they would have come to a focus at E′, as shown by the dotted lines; E and E′ being equidistant from D D, but on opposite sides of A B. The reflected ray is not quite equal in brilliance to the incident ray, a portion of the light being absorbed by the reflecting surface, but the amount of loss diminishes as the obliquity of the incident ray is increased.

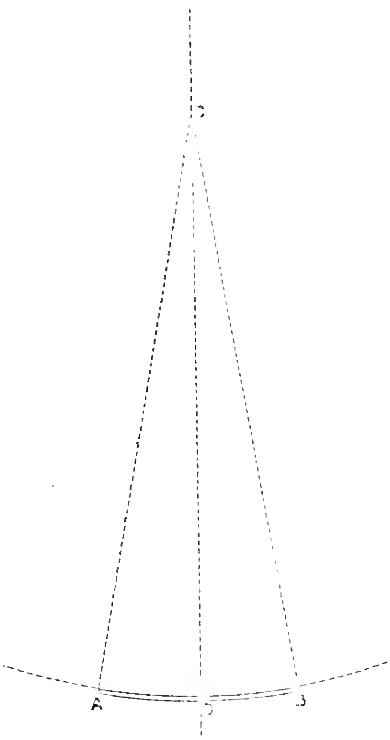


Fig. 157.

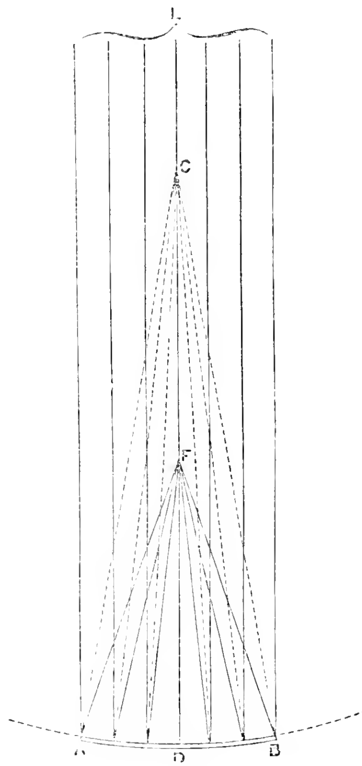


Fig. 158.

We now turn to the CONCAVE MIRROR. In Fig. 157, A B represents the section of a concave mirror, made through its central point, D. This mirror is a portion of the inner surface of a hollow sphere having the centre C. (The reader must not suppose that the mirror of his microscope has so pronounced a curvature as that shown in the figure. The real thing is a very small portion of a very much larger sphere.) C is the mirror's "centre of curvature." The straight line passing through both C and D is the "principal axis." Any line which passes through C, and through any other point of the mirror than its central point, D, is a "secondary axis." There can, therefore, be only one principal axis, while the number of secondary axes is unlimited. These expressions must be carefully distinguished from another, which I shall often have to make use of, viz. "axis of the microscope." The latter expression denotes an imaginary straight line, passing through the centre of the eye-piece, along the centre of the tube, through the centre of the object-glass, and indefinitely onwards. When the mirror is so placed that this line passes through its central point, D, the mirror is said to be in the axis of the microscope; and if the surface of the mirror be turned upwards towards the stage, so that its centre of curvature, C, be also in the same line, the principal axis of the mirror, and the axis of the instrument will coincide, and the line C D, if produced upwards from C, will pass direct to the eye-piece of the microscope. In practice this latter position of the mirror cannot be employed. It is, however, desirable always to have the point D accurately in the axis of the microscope, unless a pencil of oblique rays is intentionally to be employed. In passing, I may remark that an object on the stage, when under

observation, must, of course, be in the axis of the instrument, otherwise the eye could not see it. When, therefore, we bring rays to a focus on the object, that focus will be in the said axis also.

In Fig. 158 rays of light, L L L, which are parallel both to C D, the principal axis, and to each other, fall upon the mirror, and are reflected to a point F, in the

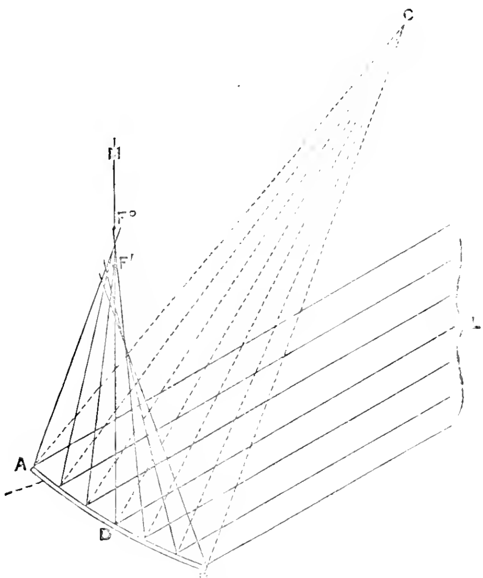


Fig. 159.

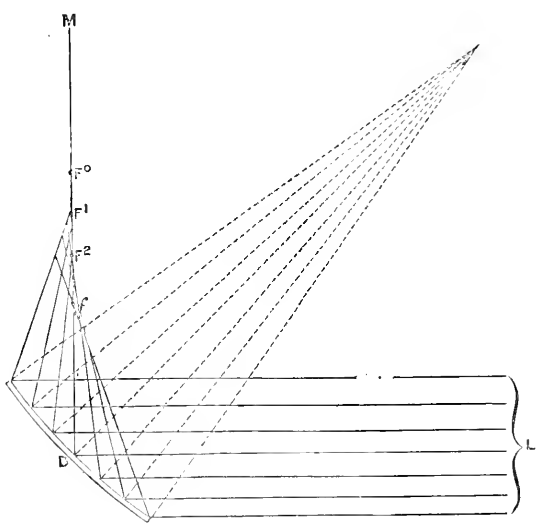


Fig. 160.

said axis, mid-way between C and D. Such parallel rays, after reflection, form nearly a true cone, whose apex is at F. This point F is called the "principal focus" of the mirror.

If the microscopist could make use of the "principal focus," it would often be advantageous to do so, because the rays are so symmetrically reflected, and so nearly brought to an exact focus; but he cannot. The object on the stage would need to coincide in position with the point F, or nearly so. The surface of the mirror would therefore be upwards towards the

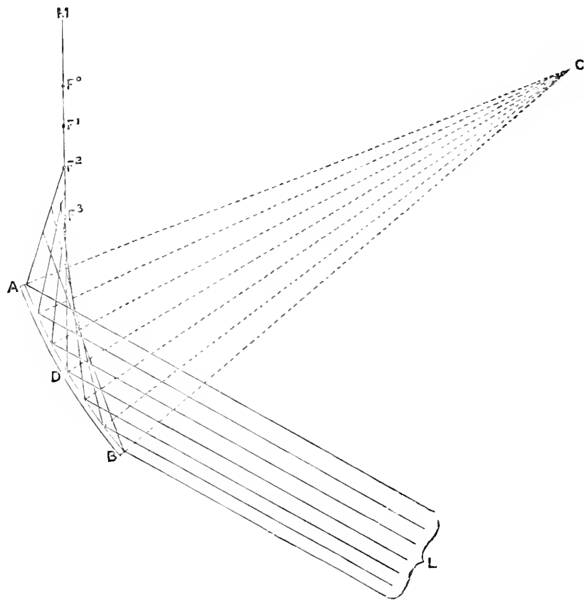


Fig. 161.

stage, the principal axis being coincident with the axis of the microscope. Further, the incident rays would need to be parallel to the principal axis, C D; the lamp and bull's-eye would have, therefore, to be placed in line with the eye-piece, and parallel rays to be directed through, and around, the tube, on to the mirror. Of course, this is impracticable, and so the "principal focus" cannot be employed.

In Fig. 159 the rays L L L are parallel to each other, as before; but instead of being parallel to the principal axis, C D, they form an angle of 30° with it; that is to say, the angle of incidence of the central ray at the point D is 30°. But it may be asked, How are angles of incidence and reflection to be estimated in the case of a curved surface? Well, a curved surface may be thought of, as made up of an infinite number of minute plane mirrors placed side by side, so that if a perpendicular be drawn to any point, reflection from that point will follow the same law as in the case of the plane mirror (Fig. 155). It conveniently happens that the required perpendicular to any point in our concave mirror is the line drawn from the "centre of curvature" to that point. The dotted lines in Figs. 158 to 161 represent these radial lines or perpendiculars. In Fig. 159 we note (1) that the parallel rays L after reflection, are

no longer brought to a nearly exact focus; (2) that the new focus, such as it is, is not, as before, in the principal axis of the mirror, C D, but distant from it, on the side away from the light; (3) that the rays reflected from the margin of the mirror are the most unruly—that is, the most affected by what is termed "spherical aberration;" (4) that if, by means of the diaphragm, we stop off all the reflected rays, except those which come from near the central point D, the latter rays will converge fairly well to a focus at a point F′; (5) that the distance of F′ from D is less than the principal focal distance, D F, in Fig. 158. (In Fig. 159 F° represents the position of F in Fig. 158, and the reader can at a glance compare the two focal lengths. It must be remembered, however, that the figure does not represent the real mirror of the microscope. If it did so, the difference of focus would be much more considerable.) (6) that since the angle of incidence of the ray at D is equal to the angle of reflection, it is equal to half the angle L D M, formed by the same ray with the axis of the microscope, M D. This relationship always exists between the two angles, so long as the mirror remains in the axis of the microscope, enabling us when one of the angles is known, readily to find the other one from it. In practice, it is convenient first to determine the angle formed with the axis of the microscope, and then by halving it to obtain the angle of incidence.

Fig. 160 has special interest for us, because it represents a position of the light which is often adopted in practice. Parallel rays here form an angle of 90° (a right angle) with the axis of the microscope, and therefore of 45° with the principal axis of the mirror. The marginal rays have become increasingly unruly; but if we stop them off, the mean focus of the rest will be about the point F^2, which is nearer to D than either F° or F′. The oblique marginal rays will be usefully brought into service in certain cases (as for the resolution of easy diatoms), by removing the diaphragm, and bringing the mirror a little nearer to the object than its mean focal length, so that the object may coincide in position with the point F^3 instead of F^2.

In Fig. 161 the rays are represented as forming an angle of 120° with M D the axis of the microscope. The angle of incidence is therefore 60°. The reader will find, I think, that the construction of his instrument will not permit the mirror to be brought much closer to the object than this arrangement of the light requires. In my own case it is necessary to slip the mirror off its stem, and to reverse the clip. In most cases 50° will be a more convenient angle of incidence.

By bringing the mirror a little nearer to the object than the distance D F^3, and dispensing with the diaphragm, a good form of incident is obtained for many "easy" diatoms.

Thus far the incident pencil has been supposed to consist of parallel rays, and it has been shown that, by merely varying their angle of incidence, both the accuracy of the focus and its distance from the mirror are entirely altered. We may suitably pause here to enquire which of the combinations figured is most to be recommended for ordinary use with transparent objects. I think the rectangular position of the light, as represented in Fig. 160, is the one entitled to pre-eminence. The lamp is not so near to the observer as to be in danger of being overturned, nor as to interfere with the free use of his left hand in moving objects on the stage; nor is it so far from him as to throw light towards his eyes, and in that way prove an annoyance. It is, moreover, the only position of the light in which the angle of incidence remains unaffected by alterations made in the slope of the microscope, so long as the flame is kept on a level with the central point of the mirror. This will be explained presently.

For special purposes other positions of the lamp are preferable. The suitability for diatoms of the arrangement in Fig. 161 has been already referred to. For objects which require direct light, and for brilliant dark-ground illumination, the more nearly we can come to the use of the "principal focus" the better. For these cases the arrangement in Fig. 159 will be found very suitable. If the other angles be adopted for direct-light objects, the diaphragm must be interposed, and all but the central rays be stopped off. In the next article, instead of passing on to the subject of divergent rays, we will endeavour to use practically the knowledge we have already gained.

(*To be continued.*)

TEETH OF FLIES.

By W. H. Harris.

No. X.—*MUSCA MERIDIANA.*

In the last paper but one of this series a very minute set of dental organs was brought under review; in the present, the other extreme is sought, and by far the largest and most numerous set of organs yet met with is proposed to be dealt with.

Musca meridiana is a large and rather handsome fly, measuring a full half-inch in length, being proportionately broad. At first sight it appears to be quite black, but a close inspection discloses the fact that it is of a very dark shade of blue, or what might be more correctly termed blue-black. The basal portions of the wings are of a deep amber shade, gradually becoming quite clear towards the apex. When its acquaintance is once made, it cannot be easily mistaken for any other member of the Muscidæ. It frequents trunks of trees, palings, gates, and in fact, delights in situations exposed to the direct rays of the sun. It is generally reputed to put in an appearance during the hottest hours of the day, and

during the warmer months of the year only, but in the season of 1884 it was taken rather plentifully during August, as late as 7 o'clock P.M., and during the warmer hours of the day it could be frequently met with as late as October. Possibly the extraordinary wave of heat which passed over this country during the summer of 1884 may have tempted this creature (like many others) to indulge in the prolongation of its appearance in public. They associate seldom in large numbers, but appear to be of a somewhat solitary turn of mind, supposing them to possess such.

The expanded lobe of the labrum is undoubtedly a very fine object as a type of this class of mouth. The pseudo-tracheæ are not correspondingly large, nor are they as numerous as may be met with in some families of this order; but the intervening spaces show, in a remarkable manner, the supporting membranes which give the necessary stability to these organs, and, very possibly, control their movement, which appears to be requisite for collecting and conveying the food on its journey to the œsophagus. These membranes are two in number for each pseudo-tracheæ; they are super-imposed, and have their margins crenulated. They are quite hyaline in appearance; polarised light does not affect them. Those which most nearly approximate to the pseudo-tracheæ are very deeply indented—giving the appearance of being a separate plate to each false ring; the broader bands are less deeply indented.

Both sets run parallel with the pseudo-tracheæ throughout their entire length. There are also other organs within the lobes, the precise object of which has not been quite made out by the writer. They consist of tolerably broad plates of what appears to be colourless chitine, as they polarise feebly. They are about ten or twelve in number, joined together at their base, which part occupies a position immediately adjoining the basal portion of the teeth, they extend towards the margin of the lobes and probably their use is to expand them, thereby causing the individual rings of the pseudo-tracheæ to separate for the admission of food, while the supporting membranes may be capable of bringing them together, and thus force the enclosed liquid food into the main channel

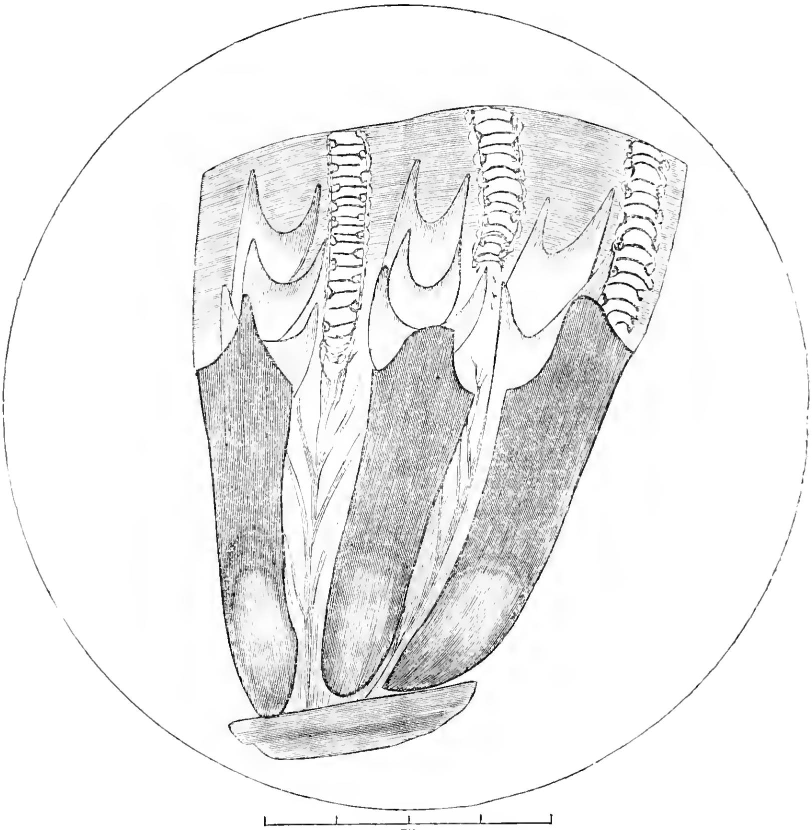


Fig. 162.—Central portion of dental organs of *Musca meridiana*.

The dentition of this creature may be expressed in the following formula, viz. 1, 1, 2, 3, 3, 4, 4, 4, 3, 3, 2, 1, 1, 1; the two single laterals occupy the posterior portion of the mouth, the three single ones the anterior. It will be seen there are fourteen of these organs in the primary set, in the second set there are nine, in the third set the number is reduced to seven, and in the fourth they are still further reduced to three. Each lobe of the labium is furnished with a group of thirty-three teeth. The laterals are small, and appear to spring from the main trunk of the pseudo-tracheæ, a peculiarity not observed in any other species so distinctly as this, though it may occur, as devoid of the curve, and taper gradually to the apex.

The succeeding rows are of a uniform type, presenting a somewhat similar appearance to the blow-fly; but they are much more deeply cleft, and instead of being V-shaped, they are more U-like in form. The primary set are of a bright amber tint, but the whole of the succeeding rows are very pale and delicate in appearance. This condition may be permanent, but there is reason for thinking it may be affected very considerably by the period which has elapsed between the emergence of the fly from the pupa-case and its capture. It is well known that

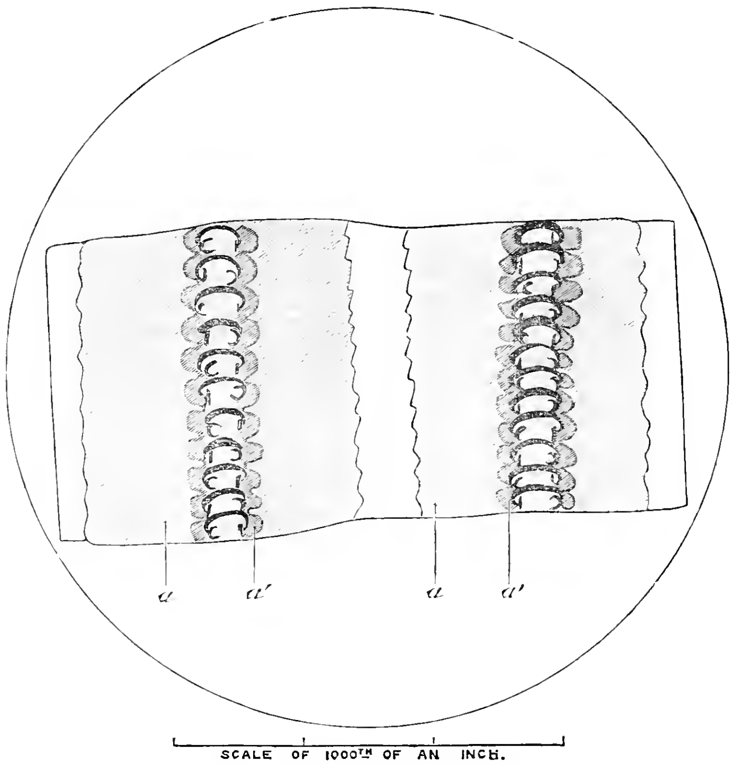


Fig. 163.—Two of the pseudo-tracheæ of *Musca meridiana*, showing the supporting membranes *a a'*.

even in the present case the employment of a rather high power is necessary to bring them into view. Considering the size of the entire group, the various rows are not so distinctly separated as in many other species. For this reason very careful adjustment is absolutely necessary in order to display them.

The primary row consists of rather broad, stout teeth, terminating in lancet-shaped points. The peculiarity, however, is the sudden curve which is made towards the free end of the organ; this is peculiar to all the teeth of the primary set, with the exception of the laterals which in the formula are represented by the single figures; these are quite chitine in its early stages is colourless, or nearly so, and that by the action of the air—and very probably light also—the darker shades are attained, and its permanent hardness established. Specimens of this fly have been dissected in which it was extremely difficult to detect the fourth row of teeth by any change of tint, the most delicate manipulation of light was necessary to discover the outline of the membrane, which would have undoubtedly developed into organs more easily seen, had the creature's career not come to such an untimely end.

The illustration accompanying these notes is a departure from the course hitherto pursued. A

satisfactory view of the entire set of organs could be given only in a plate which would trench too much upon space at disposal; and as it would only be a repetition of similar forms, a very good idea may be obtained from the small group selected, which represents the central portion in one of the lobes of the proboscis.

Cardiff.

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

[Mr. Browning's paper was unavoidably left out last month; but the series is too important for it to be omitted, and we therefore insert it now.—Ed. S.-G.]

THE astronomers who observed the total eclipse of the sun at Grenada on August 29th, had fine weather, and obtained several good photographs of the solar corona, which extended nearly two diameters from the sun, and exhibited a feathery structure at the poles.

The spectrum of the corona resembled that of the 6th of May, 1883, which was observed on Caroline Island in the South Pacific.

Dr. Hind has calculated that the comet discovered on May 22nd by Mr. Brooks has an elliptical orbit of about six and a quarter years. According to this calculation, it should return in the autumn of 1892.

The forty-first volume of the Radcliffe Observations has been published, containing the astronomical and meteorological results obtained in 1883. The number of stars observed is 919.

Winnecke's periodical comet was seen at the Cape of Good Hope on the 20th of August, at Algiers on the 23rd, and on the 28th at the Palermo Observatory by Professor Froud, who describes it as exceedingly faint, and showing traces of a nucleus. The observed place at 7 hrs. 36 min. Palermo time on Aug. 28th was R. A. 13 h. 39 m. 31 s. N.P.D. 96° 16′.

There will be no occultations of interest that can be well observed in October.

Meteorology.—At the Royal Observatory, Greenwich, the mean reading of the barometer for the week ending the 21st August was 29.91 in.; and that the variation was from 30.10 in. to 29.67 in. The mean temperature of the air was 59.8. Rain fell on four days of the week, to the aggregate amount of 0.30 of an inch.

The mean reading of the barometer, for the week ending the 28th of August, was 29.85 in.; the variation was from 30.00 in. to 29.71 in. The mean temperature of the air, 64.4, was 3.4 above the average in the corresponding weeks of the twenty years ending 1868. No rain fell during the week.

The mean reading of the barometer for the week ending the 4th of September, was 29.88 in., and the variation was from 29.79 in. to 29.95 in. The mean temperature of the air was 66.5. Rain fell on three days of the week, to the aggregate amount of 0.25 of an inch.

The mean reading of the barometer for the week ending the 11th of September, was 29.75 in.; the highest reading was 29.85 in. on Tuesday at noon and at the end of the week, and the lowest 29.54 in. on Friday morning. The mean temperature of the air was 60.1 deg., and 1.3 deg. above the average in the corresponding weeks of the 20 years ending 1868. Rain fell on four days of the week, to the aggregate amount of 0.55 of an inch.

The mean reading of the barometer for the week ending the 18th of September, was 30.03 in. The mean temperature of the air was 59.0 deg., and 1.6 deg. above the average in the corresponding weeks of the 20 years ending 1868. No rain was measured during the week.

In October, the mean temperature of Edinburgh is 48°, of Durham, 49°, of Hull, Lincoln, and Derby, 50°, of Cambridge, 51°, of London, 52°, and of the South Coast generally from Ramsgate to Plymouth 53° Fahrenheit.

The average rainfall in October is 2 inches for London and the East Coast, 3 inches for the South Coast, 5 inches on the greater part of the West Coast. This represents nearly 520 tons of water to each acre.

THE observers who went to the West Indies to observe the total eclipse of the sun on the 29th of August, returned to Southampton on the 20th of September. It is probable that the results they have obtained will lead to some important additions to our knowledge of solar physics. They were favoured with fair weather generally. Observers at Carriacore were most fortunate, so that at this station Mr. Maunder was able to obtain a good number of photographs of the spectrum of the corona. Dr. Schuster and Captain Darwin also secured photographs of the corona at Prickly Point.

It seems now more than doubtful whether it will be possible to photograph the corona without an eclipse.

Professor Tacchini made some observations of the prominences of great interest. The result was that the prominences seen during the eclipse were similar to the white prominences he observed on Caroline Island in 1883; they appeared whiter and dimmer as their distance from the photosphere increased.

Mr. Turner also observed, at the same station as Professor Tacchini, on the determination of the currents in the solar atmosphere. The white prominences he found were high and filamentous in structure, and they are thought to be caused by down rushes of matter.

Professor Tacchini thinks that the so-called comet

which was photographed in 1882, was really an object of this description.

The recent eclipse appears to be the darkest of any observed in recent times.

In November, Mercury is an evening star. Venus is a morning star. Mars is an evening star. Jupiter is a morning star.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
MERCURY ☿	5	9 15M	1 8A	5 1A
	12	9 35M	1 17A	4 59A
	19	9 34M	1 15A	4 56A
	26	9 1M	0 49A	4 37A
VENUS ♀	5	6 19M	11 18M	4 17A
	12	6 43M	11 25M	4 7A
	19	7 5M	11 32M	3 59A
	26	7 27M	11 41M	3 55A
MARS ♂	5	10 41M	2 28A	6 15A
	12	10 39M	2 24A	6 9A
	19	10 35M	2 20A	6 5A
	26	10 28M	2 15A	6 2A
JUPITER ♃	5	5 0M	10 25M	3 50A
	12	4 41M	10 3M	3 25A
	19	4 21M	9 41M	3 1A
	26	4 1M	9 18M	2 35A
SATURN ♄	5	8 35A	4 40M	0 41A
	12	8 7A	4 12M	0 13A
	19	7 39A	3 44M	11 45M
	26	7 9A	3 15M	11 17M

There will be an occultation of Aldebaran, a star of the first magnitude, on the 13th of November. The disappearance takes place at 6 hr. 27 min. morning, 165° from the vertex; and the reappearance at 7 hr. 16 min. morning, 284° from the vertex.

Meteorology.—At the Royal Observatory, Greenwich, the mean reading of the barometer, for the week ending 25th of September, was 29.77 in. The mean temperature of the air was 54.2°. No rain was measured during the week.

The mean reading of the barometer for the week ending 2nd of October was 29.79 in. The mean temperature of the air was 58.5°. Rain fell on four days of the week to the aggregate amount of 0.45 of an inch.

At the Greenwich Observatory the mean reading of the barometer for the week ending 9th of October was 29.69 in. The mean temperature of the air was 58.8°, and 5.8° above the average in the corresponding week of the twenty years ending 1868. Rain fell on three days of the week, to the aggregate amount of 0.52 of an inch.

The mean temperature for November of Berwick is 42°, of Hull is 43°, of Canterbury is 44°, and of the South Coast generally is 45°.

The average rainfall in November is 2 inches over the greater part of England, but along the South coast it is 3 inches, and on many parts of the West coast it reaches 4 and 5 inches. The last is nearly 520 tons of water to each acre.

NOTES ON A MISCELLANEOUS RAMBLE IN DEVON.

By the REV. W. DOWNES, F.G.S.

"MISCELLANEOUS." Yes; let the word stand; for, though botany was the *raison d'être* of the ramble, geology, archæology, and even such mundane affairs as luncheon and the sad sea waves will find their place in the day's experiences.

As an inhabitant of south-eastern Devonshire, living at no great distance from the reputed sole locality of *Lobelia urens*, I felt constrained to pay a visit to the spot. Sowerby (vol. ii.) tells us that this plant is only found "near Axminster in Devon," and a pencil note in the copy before me still further narrows the field to "Kilmington, near Axminster."

So to Kilmington we went, two boys and myself. As the habitat is described as a "common," there was no question as to our direction. The only common in the parish is on a hill called in the Ordnance map "Shute Hill," and locally known by that name. On Shute Hill is the boundary which separates the parish of Kilmington from the parish of Shute, and I strongly suspect that it was in Shute parish, and not in Kilmington, that we found what we were looking for, for eventually after some two hours' walking we did find it. At any rate, so far as our experience went, I should say that "Shute Hill, near Axminster" would be the most correct description of the locality of *L. urens*.

The roadside was drawn blank, and we commenced exploring across country. Though enclosed, the higher part of the hill may still, for the most part, be called "common," for gorse, heather, bracken, and dwarf birch-trees, occupy a considerable portion of the area to the partial exclusion of pasturage. We had not long left the high road before we found *L. urens* growing abundantly, but only on one very limited area of about two acres, just about where the letter "h" of the word "Shute" occurs in Sheet XXI. of the Ordnance map on Shute Hill. I found occasion to criticise another point in Sowerby's description beside that of the locality. The habitat is described as "under bushes," whereas it was plain that the plant preferred the clearings. Certainly some plants were under the shade of the bushes, but the best and strongest, and indeed by far the largest number were in the sun, and in comparatively open ground. The time of flowering too, is said by Sowerby to be "about September," and according to this we timed our visit for the first week of September. But this

year at least, it must have been ten days or a fortnight earlier, for we found most of the plants to have nearly shed their petals on the sixth day of the month.

It is curious, if it be the fact, that this plant should be only found in this one locality. But a glance at the geology of the district may throw some light upon the subject. The plant grows upon an isolated hill. It seems to be of sub-alpine habit, for it grows at an altitude of 650 or 700 feet, and it is not found lower. But Greensand caps the summit of the hill, and apparently it is not found upon the Greensand, which (by the way) is of more limited area than the map would lead one to suppose. Why is this? It may be that the soil of the Greensand does not suit it. More probably it cannot cross the boggy boundary which marks the junction of the Greensand with the Red Marl of the Trias, for it grows in as high an altitude in the Trias as it can, without entering the wet soil of the boundary. The latter is given up to Drosera, Narthecium, *Anagallis tenella*, and moss. A figure will make this more clear.

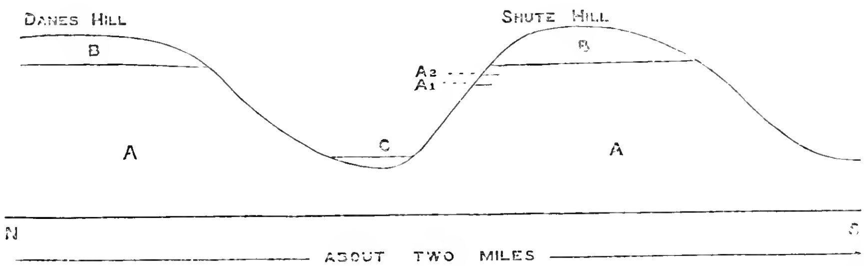


Fig. 164.—A. Red marl. A1. Zone of *L. urens*. A2. Zone of springs and bog-plants. B. Greensand. C. Alluvium.

As *L. urens* cannot get across the wet ground upwards, so also for some different reason (? insufficient altitude) it does not cross the alluvium downwards. Nor, on account of its acrid juices, will bird or beast assist in its transfer. Even the donkeys on the common leave it almost untouched. Sometimes the leader is bitten off, but one bite appears to have been always enough, even for a donkey.

Our work is done, sooner by far than we expected, and it is only luncheon time. But let us dwell for one moment upon the recollections of that enjoyable repast. It was nothing but sandwiches and sherry ; but even if it had been cold bacon and sour beer, what, could be more enjoyable than the rest and refreshment under the circumstances? The pure fresh breeze of the hill-top, the short grass of the common, the clear blue sky, the glorious view of Devonshire hills and vales, while in the foreground centaury and pimpernel are expanding their petals to the utmost, in promise of continued fair weather, to say nothing of the secret satisfaction of having achieved our task and found what we came for. We prolong the halt. My young companions cannot sit still and are off to turn stones over and disturb the ants, or to attempt to hammer micrasters out of chalk flints. In the meantime my thoughts are turned to the hill opposite, "Dane's Hill." There seem to be many traces of the Danes in this neighbourhood. A few miles to the south are the remains of some old trenches, which go by the name of Honey-ditches, which my good friend Mr. Hutchinson, of Sidmouth, has lately explained to mean Hannen's ditches, Hannen being the name of a Danish chieftain. And what is true of Honi-ditches is doubtless true of Honi-ton, not many miles distant from the trenches.

But we have time on our hands, and I summon my young companions to decide upon the disposal of it. We decide to take the train to Seaton, where the breeze blowing directly off the sea is perhaps as refreshing as that of the hill-top we have left. I feel tempted to enter into the geology of Seaton, and to show how a fault and a synclinal bring in the chalk so as to abut against the Trias and Greensand at Beer Head, which stands out a bold white promontory, contrasting with the red rocks of the rest of the coast. But this is the history of a definite day's work, which has reached its close. My lads have added nothing that is worth recording, and I, stretched upon the shingle, have achieved nothing further than writing the outlines of the present memoir upon the sandwich paper.

SCIENCE DIRECTORY.

Forest Hill Scientific and Microscopical Society. President, E. L. C. P. Hardy; Hon. Secretaries, R. H. Cowley, 46, Dartmouth Road, and A. C. Perrins, 12, Sunderland Villas.

Reading Literary and Scientific Society. President, J. H. Blake, F.G.S., Assoc. M. Inst. C.E., of H.M.'s Geological Survey of England and Wales. Hon. Secretary, W. G. Wellman, Cholmeley, London Road, Reading.

The mammoth (*Elephas primigenius*) is reported to have turned up, in the fossil state, in the eastern part of Washington Territory, U. S. A.

SCIENCE-GOSSIP.

PROFESSOR MENDENHALL, in a paper read before the American Association for the Promotion of Science, analyses the style of authors by counting the number of words of different lengths employed by them. Different writers employ a style of remarkable uniformity in the general average of words of different lengths they use. By counting and tabulating the number of letters in a thousand or ten thousand words in Dickens, Thackeray, Stuart Mill, and others, Professor Mendenhall found it possible to represent the results in a characteristic curve for each author, each curve differing from the other. He proposed to apply his scheme to deciding the authorship of Shakespere—if anybody wants to decide it. The prose and the poetry of the same author are found to contain words of the same average length. Doubters can settle the question of Bacon *v.* Shakespere for ever on Professor Mendenhall's system at a cost of a couple of hundred pounds.

ADMIRAL BEDFORD PIM, well known in connection with Arctic explorations, etc., is dead.

THE North American earthquakes have more or less continued through the month. Shocks have been felt in central Germany and in the Shetland Islands. A hill in Mexico is said to have been riven in twain. A volcanic eruption has occurred in one of the islands of the Tonga group.

ATROPIN is stated to be an antidote to fungus poisoning.

ON the 27th of October, Dr. J. E. Taylor, F.L.S., delivered a public lecture, before the members and friends of the Bolton Microscopical Society, on "Flowers and Fruits; their Relation to Insects and Birds."

A FEW days ago Salzburg witnessed a singular sight. From two to four o'clock in the afternoon an immense train of butterflies passed over the city from north-east towards south-west. They flew at a considerable height, mostly in groups, and must have amounted to millions. The groups seemed, as they went on in the common direction, to revolve also round the line of direction as an axis.

THE "Youth Scientific and Literary Society," whose headquarters are at the Tolmer's Square Institute, Drummond Street, London, N.W., continues in a prosperous state. Its official organ is "Youth," in which, during the past year, no fewer than twenty-two papers have appeared, besides others in the "Garner," etc. We are pleased to draw attention to the good work that is being done by this society.

MR. W. MARSHALL WATTS is bringing out a new and enlarged edition of his "School Flora," and he appeals to all gentlemen engaged in teaching botany at the most important schools to help him by furnishing lists of the less common plants of their neighbourhoods.

WE are pleased to see that the movement which is on foot in Norwich, to present Mr. T. G. Bayfield with a substantial testimonial, is progressing in such a way as to do honour to the old city. Mr. Bayfield has been for nearly fifty years one of the most indefatigable and modest of local scientific workers, and has exercised an enormous influence for good on the young men of the district. The Norwich Science-Gossip Club has voted 20 guineas, besides the donations of individual members.

PART eight of Mr. J. J. Harris Teall's valuable work on "Petrology" has been issued. It continues the minerals of the Serpentine rocks. The plates are those of Olivine-Hornblende-Serpentine, Plagioclase-Augite-Olivine-Mica rock, and Plagioclase-Olivine-Augite rock. It seems a pity more euphonious terms cannot be employed to correctly designate these mineral varieties of rock composition and structure.

THE annual exhibition, in all branches of natural history, of the South London Entomological Society, will be held at the "Bridge House Hotel," London Bridge, S.E., on Thursday, November 25th, next. The committee will welcome exhibits from others, as well as from members of the society. Communications to be addressed to the Exhibition Committee, S. L. E. and N. H. Society, 1 Denman Street, S.E.

THERE is a good as well as a bad side to everything. Nitro-glycerine is stated to be useful in heart-disease, especially where there is no serious organical disease or change.

MR. F. J. BRITTEN has just issued a sixth edition of his "Watch and Clockmakers' Handbook," the fifth edition of which we noticed in May 1884. For this new edition some fresh drawings have been made, and descriptions of new tools and recent horological inventions added, whilst lists of German and French technical terms are given in an Appendix.

WE are sorry to hear that Professor Sir Henry Roscoe is about to resign his position at Owens College, Manchester. If this is because of Sir Henry's parliamentary engagements, we are all the more sorry, for it is much more important he should retain his connection with chemical teaching than that he should sink and be lost among the crowd of unknown talkers now sent to the House of Commons.

MR. CLEMENT L. WRAGGE now resides near Adelaide, South Australia; and he has made over his capital collection of ethnological and natural history objects to the town of Stafford, where it will be henceforth known as the "Wragge Museum."

MICROSCOPY.

New Portable Cabinet.—We have much pleasure in calling our readers' attention to a very handy and cheap portable cabinet, recently brought out by Mr. J. B. Medland, 12, Borough. It is just the thing for a microscopist to take with him to a meeting or conversazione. It has sixteen trays to hold nine objects each, contained in a well-made polished pine-case. When closed it is the same height and width, and only two and a half inches longer than the ordinary case holding only half the number. Each glass slip is held at its ends by the projecting side flap of the tray, which is held down by the succeeding tray, and so on, the lid holding the whole firmly down. When open, the lid and front fall back (as shown in the accompanying engraving), forming a stand or table to place the trays upon, keeping them together and less liable to get displaced or upset, as when placed among other apparatus or upon the desk or work-table.

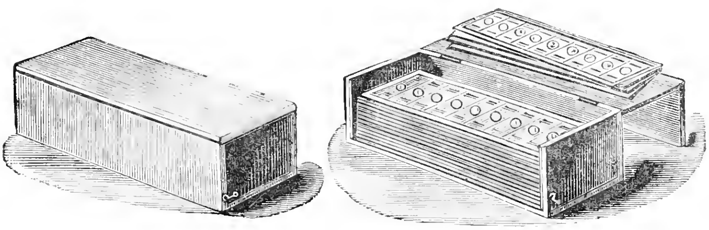


Fig. 165.—Medland's New Portable Cabinet.

Amphipleura pellucida.—In one of the earlier volumes of Science-Gossip there is a notice of the resolution of *Amphipleura pellucida* with a Seibert's $\frac{1}{16}$th water immersion and a Bramball's illuminator. I have both, and have spent many hours in trying to resolve *A. pellucida*, but without success. I do not attach much importance to the resolution of these very obstinate diatoms, and consider the time so spent might be better employed, though I have grievously sinned in this very respect myself. I should, therefore, be glad if any of your numerous contributors could spare time to say how *A. pellucida* may be resolved with Seibert's $\frac{1}{16}$th and a Bramhall illuminator—the position of the stand, the condenser, etc. I don't like to be done even by a diatom!—*W. E. Simmons.*

Cole's "Studies in Microscopical Science."—No. 3 of sections 1, 2, 3, and 4 of these important "Studies" has just appeared, and their subjects are distributed as usual among "Botanical Histology," "Animal ditto," "Pathological ditto," and "Popular Studies." The first is devoted to the structure of the leaf of the ivy, the second to the penis of an infant, the third to the acute congestion of kidney, and the last to a description of the spine and plate of a star-fish (*Palucipes membranaceus*). Each is illustrated with very artistically executed plates; and the slides accompanying them are among Mr. Cole's best mounting.

ZOOLOGY.

Slug Variation.—Mr. Williams's useful papers in your columns on this subject have certainly supplied a want, since the foreign literature on this subject is not easy of access to those living out of London. This, however, makes it the more imperative to correct such slight errors and omissions as occur in these papers, and so I subjoin herewith a list of them, giving the correct renderings only. Page 55: (1) *Arion ater*, var. *virescens*, Mill.; (2) var. *albida*, Roeb., is var. *alba*, Linn., the latter name of course having priority; (3) var. *albolateralis*, back black, sides white, fringe orange; (4) var. *pallescens*, Roeb. =*pallescens*, Moq.; (5) var. *cinerea*—this I have corrected already (p. 164); (6) var. *aterrima* is British; (7) add the varieties *plumbea**, Roeb. ("Journ. of Conch."), *reticulata**, Roeb. ("Journ. of Conch."—found in Ireland, and figured by Simroth from near Leipzig), *hibernus*, Mab. (found near Paris, Mr. Delap has found specimens of a purplish-red colour, which may be this var., in N. Waterford), *maculata*, D. and M. (dark red-brown, with black spots on the mantle), *campestris*, Mab., *livida*, Colb., *glauca*, Colb., and *rufula*, Baud.; (8) add *A. subfuscus*, Drap., with several varieties; (9) add *A. hortensis* var. *lutea*, Baud. (pale yellow, tinged with green, grey above, with two ill-marked lateral bands). Page 99: (1) I am not aware that *A. marginata* var. *rufula* is British; (2) var. *rustica*, keel (not shield) whitish; (3) add to *A. marginata* vars. *fulva*, Paulucci, and *morgianensis*, Paulucci (both Calabrian). Page 146: (1) *L. agrestis* var. *filans* is British; (2) var. *sylvatica*, Drap., is "violaceus, immaculatus," according to the original description—Moquin's *sylvatica* is not the same as Draparnaud's, but Dumont and Mortillet's sub-varieties belong rather to Draparnaud's than to Moquin's variety; (3) Mr. T. W. Brewis sent me var. *obscura* a few weeks ago from Rotherham, Yorks., together with var. *rufescens*, so these two varieties of *L. agrestis* may be added to the British fauna—I have taken the var. *rufescens* myself at Bedford Park, Chiswick; (4) var. *nigricans*—the last part of description of this is "tentaculis et linea colli utrinque nigris:" Mr. Williams translates "*linea nigris*," "a black line"; (5) var. *veranyana*, Bourg.; (6) the following

vars. of *L. agrestis* have also been described: *Norvegica*, Westerl., *Etrusca*, Issel, *xanthosoma*, Fischer, *punctulata*, Paiva, *maculata* Paiva (these two are Madeiran—they appear to be synonymous with *punctata* and *sylvatica*, Moq.), *nigrescens*, Colb., *saxorum*, Baud., and *pallida*, Heyn.; (6) *L. maximus* var. *nebulosa* is common in the London district, but it has hitherto been classed with the var. *obscura*, Moq., the two forms being almost identical; (7) var. *Mülleri* has been found at Mapperly, Notts.; (8) add *L. maximus* var. *bifasciata**, D. and M. (Truro and Bedford Park), var. *pallido dorsalis** (Roeb. MS.), Hudson (name in SCIENCE-GOSSIP 1885, p. 67; description "Journ. Conch." 1886, p. 48), var. *ornaliæ*, Pini, var. *Strobeli*, Pini, var. *Pavesii*, Pini, var. *ater*, Raz., var. *gigantea*, Baud, and var. *vinosa*, Baud.; (9) var. *quadrifasciata* is British. I will take this opportunity of describing two new varieties of *Arion ater* that Mr. J. H. James has sent me from Truro: (1) *subreticulata*, back black, sharply defined from the sides, sides yellowish, reticulated with grey (the interstices of the rugæ being of that colour), fringe yellow, with dark traverse lineoles; (2) *elineolata*, pale yellow, back grey-black, ill-defined from the sides, foot-fringe orange, without transverse lineoles.—*T. D. A. Cockerell, Bedford Park*, 1886.

HELIX HISPIDA WITH ADHERENT TENTACLES.—In the early part of this month (September) Mr. J. Wilcock, of Wakefield, whilst collecting *Helix rufescens* and *Helix hispida*, found a specimen of the latter with the tentacles grown together. They were adherent throughout, except a slight cleft at the end about a line in length. A shallow longitudinal suture was visible between the two. The animal and shell were otherwise normally formed.—*Geo. Roberts.*

LIMAX MAXIMUS, VAR. STROBELI, PINI, NEAR WAKEFIELD.—This variety was collected at Haur Park, near Wakefield, on September 12, 1886, and submitted to Mr. T. D. A. Cockerell, of Chiswick, for inspection. The body is yellowish, ashy, unicolorous. Mantle same colour as body. Keel short, coloured like the rest of the body. Sole of foot yellowish-white.—*Geo. Roberts.*

SIREX JUVENCUS.—My first specimen of *Sirex juvencus* was given to me many years ago. I had every reason to suppose that it was taken a few miles from this place, but as it was a cabinet specimen, and I had no history with it, I cannot be quite sure. It is transfixed with a common pin of the period. Last year I had a living specimen given to me. It was taken in a back yard in this town, and about the same time two specimens of *S. gigas* were also taken very near to the same place, by another person, who told me that they had some kindling (*i.e.* firewood) brought into the yard, and I presume the Sirices came out of this wood. That juvencus is British, I cannot doubt, for, in addition to the two specimens mentioned by Mr. Anderson, another specimen, at South Norwood, is recorded in the "Entomologist" for November, 1885. The editor also makes this remark:—"Both species of Sirex appear to have been unusually common this present season (1885), for quite a number of *S. gigas* and several *S. juvencus* have been sent for identification to the offices of the 'Field' newspaper." If in addition to this we take into consideration the facts, that Moses Harris, in 1782, figures and describes it as English; that Donovan, in 1806, does the same; and that Stephens, in 1835, says:—"This beautiful and extremely variable insect is decidedly the most common, at least in this country," and that Wood also mentions it in 1872, I think all doubts will be set at rest. My experience about juvencus does not agree with that of Stephens, for I have seen many specimens of gigas, but only two of juvencus. In Mr. Andrews's figure, the ovipositor seems to have been omitted. I send you a photograph taken from my specimen of *S. juvencus*. It is as nearly of its natural size as my rough method of photography permitted. The male insects are not so frequently met with, for I have not yet seen a single example.—*C. F. George, Kirton Lindsey.*

THE DEVELOPMENT OF THE TADPOLE.—On page 187, Mr. Charles Rousselet mentions an observation of his, relative to the ciliated cells in the epiderm of the frog larva, and asks whether such a condition of things has been previously described. I think not. But a striated cuticular border has been demonstrated as existing on the outer layer of the epidermis, which Professor Wiedersheim, in his "Lehrbuch der vergl. Anatomie der Wirbelthier," explains as due probably to coalesced cilia. And the fact that the *Amphioscus gastrula* has its epidermis ciliated must be considered as greatly in favour of this *phylogenetic* view. But I do certainly think that, as an *ontogenetic* point, Mr. Rousselet's observation needs a confirmation with higher powers of the microscope.—*J. W. Williams, D.Sc.*

ARION ATER AND ALBO-LATERALIS, ROEBUCK.—I have much pleasure in recording the recent finding, by myself, of the above variety in a ditch near Coatham Marshes, about one mile from Redcar, Yorkshire. This would seem to point to a much more extended distribution, for this form, than has generally been accorded to it. The slug list for the Middlesbrough district now stands as follows:—*Arion ater*, *A. hortensis*, *A. Bouginatti*, *Limax maximus*, *L. flavus*, *L. arborum*, *L. lævis*, *L. agrestis*, *Amalia gagates* and *A. marginata*.—*B. Hudson, Redcar.*

WATER-GUNS.—Can any of your correspondents explain these? They seem to proceed from some electrical condition in the atmosphere. Reports like the firing of guns are heard on the lake and shores of Loch Neagh and Loch Erne.—*S. A. B.*

BOTANY.

THE LONDON CATALOGUE. (8th Ed.)—The observations of Mr. Hamson and Mr. F. J. George, on the change of plant names in the new edition of the London Catalogue, have made known one or two important facts. The most valuable, in my opinion, is that the editor has adopted the alterations in the last edition of Hooker's "Student's Flora" almost purely and simply. My complaint is that changes have been made in names given to plants by such an eminent authority as Linnæus, apparently without sufficient justification. I cannot agree with Mr. George in thinking that, in such a matter, we ought to take the ipse dixit of an eminent modern botanist, without an explanation of his reason for making the change. Although I may lay myself open to Mr. George's threat of having to part company with modern scientists—a censure I should be sorry to deserve—I must crave the attention of your botanical readers to the statement of a few reasons against changing names which have long ago been published by eminent botanists, and have up to the last year or so received the sanction of authors of Floras and Catalogues of Plants. To be more specific, let us consider the case of the plant to which Mr. Hamson refers, the perfoliate yellow-wort. On referring to the 1797 edition of "English Botany" I find this plant figured at t. 60, and the name given as *Chlora perfoliata*, with the plant characters. The synonyms there given are as follows: "*Chlora perfoliata*, Linn. Syst. Nat. ed. 12 v. 2. 267. Studs. Fl. An. 168. With Bat. Arr. 392. Relb. Cant. 157. *Centaurium luteum perfoliatum*. Raii Syn. 187." In Dr. Smith's Flora, published about 1820, this plant is described as *Chlora perfoliata*. Professor Babington, in the eighth edition of his "Manual of British Botany" (1884) retains this name. In the second edition of Hooker's "Student's Flora," and in the seventh edition of the London Catalogue (edited by the late Mr. H. C. Watson) this plant is named *Chlora perfoliata*. The eighth edition of the London Catalogue, presumably on the authority of Sir J. Hooker, gives *Blackstonia perfoliata* in place of the old name. On turning to that admirable work on Structural Botany by Dr. Asa Gray (who certainly ranks amongst the eminent scientific men of this day) I find the following observations on the "Fixation and Precision of Names." "The name of a plant is fixed by publication, and takes its date from the time when it is thus made known to botanists. A genus or other group is published when its name and characters (or the differences between it and all other such groups) are printed in some book, journal, or other adequate vehicle of publication, which is placed on public sale, or in some equivalent way is distributed among or within the reach of botanists. A printed name without characters, and characters without name, do not amount to publication." These conditions have been fulfilled in the case of *Chlora perfoliata* by Linnæus, followed (*inter alia*) by Sowerby, Smith, Babington, H. C. Watson, and Sir J. Hooker. What has happened to justify the change? Has the plant recently been referred to another genus, and if so, on what grounds? Has something of importance with reference to this plant been discovered since the publication of the second edition of "The Student's Flora"? If so, it would be both instructive and just to botanists to tell them plainly what it is. "In transferring a species from one genus to another," writes Dr. Asa Gray, "its specific name must be preserved (with alteration of the gender if need be) unless there is urgent reason to the contrary. It must necessarily be changed when there is already in that genus a species of the same name; and these synonymous names of the transferred species have their claim in order of date. But whatever name is first employed under the accepted genus, being unobjectionable, should hold even against an older unobjectionable one coming from a wrong genus. This is an application of the stringent rule, that no needless names should be created." In a note to this passage, Dr. Asa Gray quotes the following observations of Bentham ("Notes on Euphorbiaceæ," in Jour. Linn. Soc., xvii. 107, Nov. 1878). "It should be well borne in mind that every new name coined for an old plant, without affording any aid to science is only an additional impediment." Let me state, what should almost go without saying, that my only object in writing on this subject has been, if possible, to elicit the reason for these changes of name, and to get at the means of judging as to whether they are justified. I have the highest respect for Sir J. D. Hooker, and, I hope, appreciate as fully as Mr. George, the great advantages he possesses for acquiring accurate knowledge. The London Catalogue is such a useful little book to botanists that all must wish to see it as accurate as possible. This correspondence may elicit facts that will make it none the less appreciated than it has hitherto been.—*W. G. W.*

FLORAL MONSTROSITIES, &c.—I send you a monstrosity of a rose which was gathered in our garden last July. You will see that its sepals are all more or less developed into leaves, while out of its centre grow three more or less ill-formed buds, a small growth which has not made up its mind whether to be leaf or flower, and one perfect leaf. This last-mentioned leaf I think strangest of all, since one would not expect anything but imperfection to grow out of such a muddle. I also enclose some *Ballota nigra* which has branches growing in the axils of several of the bracts, these branches themselves bearing bracts and whorls of flowers. I picked it here a few days ago; it was growing among grass in rather a damp place. Last autumn we found on the

South Downs, near Eastbourne, four or five daisies of the ordinary form, except that each had a ring of ligulate flowers about half-way from the centre to the circumference. Two or three of these plants I brought home and potted up, but this year they only bore ordinary flowers.—*Frank Sich, jun.*

NOTES AND QUERIES.

HUMBLE-BEES AND FLOWERS.—I can quite corroborate Mr. R. Paulson's observations as to humble-bees obtaining honey from Antirrhinum blossoms in a surreptitious manner, as I have frequently noticed them doing so myself; and on examining flower-spikes of this plant I have found nearly every blossom pierced at the base of the corolla. But I have also noticed humble-bees obtaining honey in the legitimate manner, and I should say far oftener in this way than in the other. Müller is, I think, quite right, for "the fast closure of the mouth is useful," as he mentions, in a great number of cases. Opening the flower at the bases would seem to be a foolish action on the part of the bee, rather than a sign of increasing intelligence, as it must enable other insects to obtain access to the honey, which otherwise they would not be able to reach. One day I was watching the humble-bees at work, crossing the flowers in a long mixed border, and found that they only visited the snapdragon, and in the legitimate manner, as if they knew they were more likely to find what they wanted in them than in other flowers. It is very pretty to see them settle on and cling to the lower lip of one, which immediately falls with their weight, and enables them to thrust their heads well into the flower. The older blossoms open easier than the younger ones do. I found that on an average a weight of twenty grains was required to make the lower lip fall a quarter of an inch; the lip of one fell with only three grains, whilst the flower which was most difficult to open required thirty-four grains. The blossoms of the common broad bean are also pierced at the base by humble-bees.—*G. S. S., Tunbridge Wells.*

FEMALE VIPERS.—I killed near Wickham, Hants, on Friday, the 14th, a female viper. It was two feet long, and very large. Thinking it had young, I opened it, and was surprised to find no less than seventeen, all about six inches long, and proportionately large. The markings were distinctly shown, and even the swelling in the upper jaw for the fangs, strongly shown. Is not this a great number for the viper to bring forth, and to contain in the stomach?—*J. J. Moore.*

MOCK-SUNS.—On Tuesday, July 27th, afternoon, while out sketching near Cranbrook, in the weald of Kent, I and my wife saw a magnificent example of mock suns and solar rainbow circles. From an early part of the day the sky had been, I think, more splendid in its arrangements of Cirro-cumulus and C. striatus clouds than I had ever seen in this or any other country, though I have always been a delighted student of these phenomena. From 10 A.M. to 4 P.M. there was an incessant change and coolness in the forms and positions of the clouds, and the remarkable perspective effects thereby produced. But, about four o'clock, one half of the heavens, from the horizon to the zenith, in the westerly direction, became nearly covered with a thin stratum of dark clouds, resembling more than anything else innumerable long bundles of cotton fibre, placed in every possible direction. The other half of the sky was a background of most delicate rich ultramarine, with the fleecy mare's tail and flock of sheep cloudlets as the subjects. On the dark strata of clouds the mock suns made their appearance, the real sun shining through the clouds with great intensity. This beautiful phenomenon did not fade out till nearly six o'clock. As I saw it also for some time reflected on a large sheet of water, I had good opportunities of studying it. The setting of the sun that night was a gorgeous pageant, myriads of golden streams, in groups, being sent up from purple and scarlet clouds, whilst fantastic and suggestive groups of clouds slowly sailed along the clear sky above.—*Robert H. F. Rippon, Jasper Road, Upper Norwood.*

PHENOMENAL BUGS.—Apropos of an incident narrated in your last number of SCIENCE-GOSSIP, where myriads of bugs made a sudden appearance on board a vessel, off the coast of Algiers, I can narrate a somewhat similar experience, but which has an extra interest, as touching the vexed question, as to whether under any circumstances Cimices—presumably Lectularius, classed as "Hemiptera"—can ever be provided with full-sized wings, and use them for flight. In one of my journeys through Syria and Palestine with a party, which included two ladies, we had encamped not very far from Baalbec in Cele-Syria; it was after sunset, and we were all in our respective tents preparing for dinner, when a servant came in hot haste and entreated me to go at once to the ladies' tent, for there was "something very dreadful." What I saw on my arrival, almost merited the sensational description: the whole of the ladies' paraphernalia, clothes, bed, toilet-table, inner wall of tent, were covered with a dense mass of bugs, apparently the common bed-bug, like in size, like in odour, presumably from those destroyed in desperate efforts to get rid of them, and, so far as could be made out, like in conformation, except that it was noticed at once, that these malodorous insects were provided with wings! Impossible to make a detailed examination, for I had not even a pocket lens with me; it was night, the camp was in an uproar, and the half-frantic ladies had to be quieted, and moved into another tent, which last was soon done, for, oddly enough, the ladies' tent was the only one out of near a dozen, into which the strange visitors had penetrated. When matters were quiet, I went to pay a visit to the insects, to make out what I could as touching their species. To see hemiptera fully winged was rather startling, as well as to find myriads of the creatures appearing suddenly, miles away from any house or village. I even took a small tin case, to enclose specimens of these phenomenal bugs—useless precaution, for, on entering the ladies' tent, there was not a bug to be seen, all had quitted as mysteriously as they came, only leaving an odour which, as the ladies complained, clung around their belongings for many a day. Now were these the bugs usually figured, and pretty well known to the public as well as to microscopists? Westwood admits that narratives of winged bugs have been presented from time to time, but he naturally hesitates over the matter. My notion, of course, was that these malodorous visitants belonged to a species nearly allied to the domestic pest. It was strange that the swarm came so suddenly, that all disappeared within a couple of hours, and that the ladies' tent alone should have been selected for the visitation. All this took place some years ago; but it was an episode in travel not likely to be forgotten, and I am glad to contribute the curious fact to the peculiarly appropriate pages of SCIENCE-GOSSIP.—*John Anthony, M.D., F.R.C.P.*

Poisonous Properties of the Yew.—Apropos of Mr. Modlen's article on the poisonous properties of the yew, the following extract, taken from the "Oxford Times," may interest your readers: "Mr. Brown, of the Bridge Inn, Richmond, has had a couple of horses poisoned by eating yew, and in one case it has proved fatal. The gentleman in question is the occupier of Captain Smurthwaite's Temple Grounds, and on Friday, it would appear that the animals had been eating some yew from the trees on the Dark Walks. One of the animals died very quickly, and the other was suffering very much. A few years ago, several bullocks belonging to Mr. R. Middleton were poisoned in a similar way." It must, one would think, possess extremely poisonous qualities to act fatally on such robust animals as horses, cattle, and bullocks.—*R. A. R. Bennett, Watton Manor Lodge, Oxford.*

Solanum Dulcamara.—Referring to the notes in your last issue as to whether the fruit of this plant is poisonous, from experiments conducted by myself I can safely say it is. I have succeeded in obtaining an alkaloid similar to that obtained from Belladonna, namely atropine. It has the power of dilating the pupil of the eyes, and appears to hold a position chemically between atropine and physostigmatine. I hope before long to give a thorough analysis of this interesting alkaloid. I may add a larger percentage is obtainable from the ripe berries than from the unripe.—*Fredrick Davis, Croydon.*

Tenacity of Life in Moths.—Mr. Finch's remarks are very true, but he does not give the reason of this tenacity of life. If we examine the anatomy of the moths in question, we find that its nervous structure is rather peculiar. The chief mass of ganglia is situated between the second and third leg, about the centre of the body. If this mass of ganglia be pierced in such a manner as to separate it, we shall find that real life is immediately extinct, although muscular effort takes place for some time after, which is supported by the smaller masses of ganglia; these, however, quickly become worn out, owing to their separation from the principal nerve-centre.—*Frederick Davis, Croydon.*

Bird Sounds.—The grasshopper warbler (*Salicaria locustella*) is, I believe, the bird referred to by C. C. S. Its sibilant note—like that of the night-jar on a small scale—is heard mostly in the evening. It is sometimes called the cricket bird, from the peculiar chirp or rattle of its song. It is by no means a common visitor. I have only heard two this summer. Your correspondent "Mark Antony" is clearly in error, in confusing the willow wren and the chiff-chaff. The birds are totally distinct, and the songs of no two birds could be more dissimilar. The former has a plaintive song nearly two octaves in length, while the latter has but two solitary notes, which it repeats in a cheerful and lusty strain.—*G. W. Hall.*

Query as to Moss.—I should be glad if any of the readers of Science-Gossip could tell me whether the species of moss described below is already known? It is not mentioned in any work which I have access to. Stem erect, unbranched; leaves long, slightly twisted and distantly toothed; seta short, capsule minute, rounded with mouth covered by a membrane, as in hair-moss, no visible peristome; the operculum and calyptra unfortunately failed. Seta springing from the midrib of the leaf, sometimes as many as fourteen capsules on one spray.—*G. C. Goody.*

Astynomus ædilis.—Of this longhorned beetle I have three specimens, two of which, a male and a female, were taken at Elswick, Newcastle-on-Tyne, on Sept. 2nd, 1870, and Aug. 30th, 1871, respectively. The third, a female, was taken at the railway station, Cardiff, Wales, on Sept. 8th, 1871, and forwarded to me living by a brother. One of the females is seven lines long, exclusive of the ovipositor, which projects fully a line beyond that—the extremity of the elytra; the other, which is larger and stouter every way, has a length of nearly eight lines, the ovipositor being projected one and a half line beyond the elytra. The male, which is the smallest, is only six lines long, but has much the longer antennæ. —*Charles Robson, Elswick, Newcastle-on-Tyne.*

Channel Islands.—Will some one inform me what is known of the introduction of the Mesembryanthemum into Jersey? I have met with it in two places—a sandy bank in the middle of St. Aubyn's Bay, and the battery at La Moye Point, growing freely in great abundance, and I have little doubt it can also be found elsewhere. It was in bloom (August) at the latter place, and the large yellow flowers were very handsome. I do not find it noticed as an introduced species in any of my English botanical works. Another well-established plant that I wish for information about is what is locally called wild rhubarb, to be found abundantly in the moist glen leading down to Moulin Huet Bay, Guernsey. This plant has the general character of giant rhubarb, with leaves as high as six feet, but rough, and the flower or fruit resembles clusters of prickly fingers, pinkish-green in colour. I have not found any record of this either, and should like to know its history.—*H. Epps, Upper Tulse Hill.*

Triple Trees.—A curious combination is to be seen in Asbridge Park, three trees having grown together. The larger one is a beech, the other two an oak and a thorn. Roughly speaking, I should judge the diameter of the beech to be about eighteen inches, and the oak and thorn about five inches each. The junction is so close that they look as if all sprung from the same root.—*C.*

Toads in Rocks.—That toads have actually been found alive after the lapse of many years in the heart of solid rocks and internal cavities of trees is a fact, the evidence of which is abundant and irrefutable. Some naturalists have thought that these imprisoned toads must have been supplied with air through some imperceptible hole, and also must have been nourished by insects, which had managed to enter through some fissure in their prison-house; but then, again, cases have occurred when all possible secret and surreptitious entrances of provender or air in any shape whatsoever have been completely obviated. What, then, are we to think about the matter? How can we account for this most wonderful and interesting physiological phenomenon? Dear old Gilbert White firmly believed in the prolonged abstemiousness of these toads: so did the French Academy of Sciences; so did Mr. Jessie. Frank Buckland and the late Canon Kingsley, on the other hand, did not believe in it, no more than many people believed in the late Dr. Tanner, the American gentleman who did something "big," in the way of fasting for forty days. We find, however, that other animals are quite capable of a similar abstemiousness. Thus, the house-bug can fast for three months or more, etc. The fact is, that toads thoroughly cleanse their food before they swallow it, and they scratch their stomachs and twitch their toes so violently after a full meal, as if they had had a surfeit of it. All this combined with their well-known Celtic nervous springiness, liveliness, and

vitality; their powerful double avenues for aeration; their cool, big-corpuscled blood; and their unmistakeable zoological aspect, and half-way position between the lively, well-oxygenated fishes, on the one hand, and the equally well-oxygenated birds on the other, ensure a power potency and vigour of life-energy, which years of abstemiousness cannot abate or conquer. The late gallant, thoroughly English Canon Kingsley, or a stout, hearty, well-fed yeoman farmer might regard stories anent the fasting proclivities of these animals as mere idle tales; but the evidence is clear and irrefragable that such indeed are quite true. All types and figures of men and of human life seem to be symbolised by the lower animals; and why may not the eremitic monk, the lean, solitary hermit be represented, as anybody else? Perhaps I may, with the editor's kind permission and indulgence, offer at some future time to the pages of SCIENCE-GOSSIP a detailed statement of these types and symbols of humanity, figured and shadowed forth in the demeanour and habits of the lower animals. It will then, I trust, be seen that many Biblical references, etc., are founded on fact; and that, whatever we may opine anent the descent of man, we may rest assured that the lord of creation has, in the course of generations, impressed certain qualities, characters and habits on the brutes, which are very marvellous, and extremely interesting from every point of view.—*P. Quin Kegan, LL.D.*

HEDGEHOG.—While staying last week near Cambridge, I observed one day in the garden a young hedgehog apparently dead, with its head almost covered with blue-bottles' eggs. On moving it, I discovered it to be still alive, though only partially able to coil itself up, and to have lost both its eyes. These had not been removed bodily, but merely burst, as the empty cases still remained in the sockets. Otherwise, the animal seemed uninjured, and there were no traces near to suggest the cause of the injury. What could have deprived the poor little creature of its eyes? On skinning it afterwards, I happened, naturally enough, to prick my fingers in handling its spines, and before long I observed a considerable blister on each spot where I had been pricked. This seems to suggest that the spines are charged with poison. Is it so? I have never seen the fact mentioned. Speaking of skinning, reminds me that I also want to ask what is the best way of moistening arsenical soap when it becomes too thick or hard. Ought one to use spirit, or will water answer the purpose?—*J. H. K.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

TO ANONYMOUS QUERISTS.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

TO DEALERS AND OTHERS.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

WE request that all exchanges may be signed with name (or initials) and full address at the end.

F. BUSSETT.—The white variety of the Devil's Bit Scabious is not uncommon.

R. DAVIDSON.—There is a variety of "honeycomb quartz" which has been formed in the way you mention, viz.: by the deposition of silica in cracks, and the subsequent dissolving away of the intervening material. (Qy. 2.) Get Sir George Cox's "Comparative Mythology of the Aryan Nations," or his "Manual of Mythology," price 4*s.* 6*d.*, published by Macmillan.

D.A.K.—1 and 2, yellow bunting (*Emberiza citrinella*); 3, chaffinch (*Fringilla cœlebs*); 4, black cap (*Carruca atricapilla*); 5, reed warbler (*Salicaria arundinacea*); 6, sedge warbler (*S. phragmitis*); 7, willow warbler or wren (*Sylvia trochilus*); 8, common white-throat (*Carruca cinerea*); 9, lesser white-throat (*C. sylviella*); 11, tomtit or bluetit (*Parus cristatus*); 12, long-tailed tit (*Parus caudatus*); 13, common white-throat (*Carruca cinerea*); 14, tree pipit, variety of, rather uncommon (*Anthus arboreus*); 15, skylark (*Alauda arvensis*); 16, common white-throat (*Carruca cinerea*); 17, chiff-chaff (*Sylvia hippolais*).

W. HAMBOROUGH.—The insect is the mealy bug.

J. W. E.—Your zoophytes are: (1) *Cellularia fistulosa* (a polyzoan); (2) the squirrel's-tail coralline (*Sertularia argentea*, a hydrozoan).

E. HALKYARD.—Apply to Mr. W. P. Collins, 157 Great Portland Street, or Mr. W. Wesley, Essex Street, Strand. Both are scientific booksellers, and will answer your question, and also give prices, &c.

R. H. W.—The Publishing Offices of the British Association are at Albemarle Street, London, where you can purchase the Reports, and get other information.

EXCHANGES.

STEWARD'S "Educational" microscope, one eye-piece, combined 1-in. and ¼-in. objective, analyser, and polariser, with selenite slide, stand condenser, live box, with coarse and fine adjustment, in mahogany case. In good condition.—G. F. Bergin, jun., 43 Fernbank Road, Redland, Bristol.

INJECTED and stained slides of frog, also stained slides of earthworm, horse leech, human liver, kidney and lung, dog's ear (Pinner), etc., exchanged for good slides from vegetable and animal kingdoms, or good insect mounts.—C. A. Lowe, Crankhall Lane, Wednesbury.

WALTER'S "Birds of Ireland;" "Naturalist," vol. v.; "Familiar Wild Birds," 20 parts; "Midland Naturalist," vol. i.; "Practical Taxidermy," by Montagu Brown; "Sermons in Stones," etc., in exchange for other books or offers. Wanted, "Gardening Illustrated," vols. ii. iii. and iv.; Harting's "Birds of Middlesex;" "British Song Birds," by Neville Wood.—Rev. W. W. Flemyng, Coolfin House, Portlaw, co. Waterford.

SIDE-BLOWN eggs of pheasant, jay, starling, redstart, spotted flycatcher, willow wren, long-tail tit, blue tit, bullfinch, white-throat, lesser white-throat, in exchange for side-blown eggs of hooded crow, carrion crow, chiff-chaff, tree pipit, tree sparrow, garden warbler, sand martin, etc; single exchange preferred.—James L. Mott, 18 Grafton Place, Northampton.

OFFERED, L.C., 8th edition, Nos. 2, 107*b*, 185, 193, 198, 208, 217, 238, 291, 303, 372, 373, 375, 380, 393, 402, 477, 486, 487, 537, 544, 661, 662, 680, 687, 733, 746, 925, 929, 930, 948, 954, 993, 997, 1009, 1043, 1058, 1059, 1077, 1220, 1309, 1310, 1328, 1330, 1335, 1354, 1365, 1423, 1452, 1579, 1605, 1649, 1771, 1788, 1829.—Wm. Smith, Ormiston Lodge, Arbroath, N.B.

WANTED, Thomé's "Botany." Will give in exchange Foster and Balfour's "Elements of Embryology" (1874) or Dr. Buchner's "Man in the Past, Present, and Future," translated by Dallas.—J. W. Williams, Gothic Cottage, Serpentine Road, Park Village East, N.W.

OFFERS of British dried plants requested in exchange for Part I., vol. i., Sowerby's "English Botany," 1886, 3rd ed. new and perfect condition, 27 hand-coloured plates.—Tom Watson, 54 Bank Parade, Burnley.

OFFERED, one-holed clutches of whooper swan, rough-legged buzzard, marsh harrier, Montagu's harrier, kestrel, long-eared owl, dipper and nest, stonechat and nest, sedge warbler, grey wagtail and nest, rock pipit and nest, corn bunting, magpie, swift, turtle dove, snipe, ringed plover, water-hen, kittiwake, herring gull, Iceland gull; eggs of gold crest, rock pipit, hooded crow, nightjar, heron, guillemot, razor-bill, gannet, shearwater, storm petrel; wanted, good clutches. State offers, and all desiderata.—R. J. Ussher, Cappagh, Lismore, Ireland.

PYE-SMITH'S "Scripture and Geology;" Trench's "Study of Words;" "Roxburgh Ballads," 2 large vols., cuts of costumes, 1873, for natural history books, or a collection of shells. Various common shells (duplicates) offered to beginners in conchology who will send box, and stamps to cover return postage.—George Roberts, Lofthouse, Wakefield.

WANTED, SCIENCE-GOSSIP for March, 1884.—C. W. Maw, 9 Fairfield Road, Bradford, Yorkshire.

"Popular Science Review" and "Intellectual Observer." Any possessor of the above (complete sets) and willing to dispose of same, please write to—F. R. Brokenshire, 24 Oxford Terrace, Exeter.

Wanted, any works of Swift, Poe, Balzac, Pope, Browning, Daudet, Swinburne, Matthew Arnold, Landor, and Meredith, in exchange for "Nature," vol. xxxi. 1884; "Knowledge," vols. iv.-vi. 1883-1884; Science-Gossip, 1883-1886; Teall's "British Petrography," now publishing, parts 1-8 (all out); "Science Monthly," vols. i. and ii.; "The Naturalist's World," vol. i; "Science for All," vol. i.; "Geological Magazine," 1884-1886; "Cricket," 1886; and other natural history and geological works. For list, apply to—W. G. Spencer, The Fosse, Leicester.

Duplicate eggs for exchange: lesser redpoles, sedge warbler, lesser whitethroats, chaffinch, greenfinch, whitethroats, may be had in clutches, some with nests; carrion crows, rooks, tree pipits, sand martins, moorhens, partridges, ringdove, teals from Thorne Moor, Yorkshire, and kestrel. Desiderata, numerous in British birds' eggs.—E. G. Potter, 19 Price Street, York.

Wanted, a secondhand pine cabinet to hold 1000 slides.—W. Grierson, Owens College, Manchester.

Wanted, W. B. Carpenter's "The Microscope and its Revelations" (4th or 5th edition).—H., Norfolk Villa, Hyde Road, Eastbourne.

Wanted, batches of *Helices nemoralis* and *hortensis*, alive or dead, from all parts of Great Britain; exchange, *Unio margaritifer*.—B. Hudson, M.C.S., 5 Westbourne Grove, Coatham, Redcar.

Offered, L. C., 8th ed., 123, 135, 144, 297, 590, 635, 899, 1198, 1417, 1620, etc.; many desiderata.—W. A. Clarke, The Grove, Chippenham, Wilts.

Good cabinet of micro slides (all first-class mounts), six dozen in all; the list comprises the following: Diatomaceæ, Polycystinæ, Echinodermata, Polyzoa, Spicula, and botanical sections, mostly double-stained; full catalogue sent on application. —W. M. Ranson, The Cottage, Priory Road, Anfield, Liverpool.

Microscopic slides, miscellaneous, unmounted material, and turntable. Wanted, a permanent horse-shoe magnet, about 7 in. or 8 in. legs, for electro magneto machine, or other offers. —P. Kilgour, 2 Ogilvie's Road, Dundee, N.B.

Naturalists having duplicates would aid in the spread of natural history if they send specimens for a "Boys' Museum" in a London Board School.—W. E. Watkins, Board School, Station Road, Highbury, London, N.

Wanted, specimens of quartzite from various formations, with or without fossils.—A. T. Evans, 171 Cooksey Road, Small Heath, Birmingham.

Wanted, all kinds of insects, whole (except butterflies), either fresh-caught or preserved in weak spirit and glycerine; also foraminiferous material, containing a large number of species of British forams, in exchange for micro fungi. For particulars apply to—W. H. Pratt, 49 Dryden Street, Nottingham.

Wanted, vols. xv.-xvii. of Science-Gossip; also Charles Darwin's "Origin of Species."—L. Francis, 16 Wansey Street, Walworth, S.E.

Wanted, stand condensor for microscope, or any other microscopic apparatus.—L. Francis, 16 Wansey Street, Walworth Road, London, S.E.

Valuable collection of carboniferous limestone fossils; also interesting series of lias and oolite fossils for disposal. Wanted, early "Journals of Geological Society," lias gasteropoda, or offers.—E. Wilson, F.G.S., 2 The Polygon, Clifton, Bristol.

Dionysius's "Geography," poetical, with Latin translation, notes, 16 maps, etc.; maps delineating the Great African lakes, recently discovered. Wells, 1761. Wanted, botanical slides, microscopic, or offers.—J. Wallis, 50 High Street, Deal.

"Midland Naturalist," complete to end of 1886; wants and offers as above.—E. Wilson, F.G.S., 2 The Polygon, Clifton, Bristol.

Wanted, vols. i. and ii. of "Quarterly Journal of Microscopy."—L. Francis, 16 Wansey Street, Walworth Road, S.E.

Wanted, many species of British birds' eggs not in collection, in clutches only, with full data, for good clutches of curlew, etc. —Tom Brown, Auchenhessnane, Penpont, Dumfriesshire.

What offers for longitudinal and transverse sections of Rhysome of Pteris? Wanted, toads or frogs.—Richard Tomlins, 36 High Street, Gosport, Hants.

A few specimens of Carnelian arrow tips from Arabia, described in Science-Gossip for May 1886, for exchange.—Edward Lovett, West Burton House, Croydon.

"Year Book of Facts of Science and Art," for the years 1839-1853, including the extra volume for 1851 of the Great Exhibition, also for the years 1858-1861; will exchange for microscopical accessories.—W. Turner, 89 Terminus Road, Eastbourne, Sussex.

Will any conchological collector in Malta oblige by exchanging shells with—E. B. F., 82 Abbey Street, Faversham, Kent, England.

Will any collector resident in London assist a beginner to name his small collection of European land shells? Duplicates would be gladly given in return for the service asked.—Lt.-Col. G. Parry, 48 Duke Street, St. James's.

Offered, variety of chemical apparatus and books or micro slides. Wanted, lantern transparencies, coloured or plain.—H. W. Case, Cotham, Bristol.

Wanted, insects' eggs and moths' and butterflies' eggs, both opaque and in liquid. Will give in exchange micro fungi spores from the white poplar leaf.—John Longstaff, King's Arms Terrace, Caldmore, Walsall.

Wanted, any odd parts of Brown's "Fossil Conchology," also any parts of "British Organic Remains." State requirements.—Geo. E. East, jun., 10 Basinghall Street, London, E.C.

For exchange, rare land shells from Ceylon; also new species of Bulimus from Mount Roraima. Offers solicited.—Miss Linter, Arragon Close, Twickenham.

Wanted, British and foreign shells. Can offer in exchange good foreign stamps.—Thomas W. Reader, 171 Hemingford Road, London, N.

British Lepidoptera, rare and well-set specimens; also about 50 species of American and Indian eggs. Wanted, British eggs.—Thomas H. Hedworth, Dunston, Gateshead.

For exchange, a collection of fossils, including fine series of flint and greensand species, and also some Canadian silurian.—J. A. Floyd, 18 Whiting Street, Bury St. Edmunds.

For exchange, *Unio margaritifer*, *By. tentaculata*, *P. complanatus*, *H. nemoralis*, *hortensis*, and *ericetorum*. Desiderata: *U. pictorum*, *L. auricularia*, *H. revelata*, *pisana*, *obvoluta*, *B. montanus*, *C. Rolphii*, *biplicata*, *Cy. elegans*, and many others.—T. A. Lofthouse, 67 Grange Road, Middlesbro'.

For exchange, silurian, carboniferous limestone, lias, and cretaceous fossils; also Irish and other minerals.—M., Culver Lodge, Acton Vale, London, W.

Wanted, Diatoms and Polycystina, unmounted, in exchange for mounted slides, really good.—Thomas Groves, Kilburn Dispensary, N.W.

Herring gull, alive. What offers? Wanted good seaweed album with or without named specimens. Will exchange *Dasya arbuscula*, or other algæ, for *Padina pavonia*. J. W. Etherington, 4 Hyde Road, Eastbourne.

Offered, L. C., 8th ed., 50*b*, 51, 288, 385, 661, 662, 663, 863*d*, 869, 873, 945, 993, 1076*c*, 1431, 1461, 1507, 1517, 1519, 1524, 1585*b*, 1614*b*, 1616*b*, 1616*c*, 1617, 1665, &c., in exchange for other less common British plants. Exchange lists with Dr. Davidson, Sanguhar, N.B.

BOOKS, ETC., RECEIVED.

"Heroes of Science. Physcists," by William Garnett, M.A., D.C.L. (London: S. P. C. K.).—"Euclid Revised. Books 1 and 2," by R. C. J. Mixon, M.A. (Oxford: at the Clarendon Press).—"Fourth Report of the United States Entomological Commission, on the Cotton Worm and Boll Worm," by Charles V. Riley, Ph.D. (Washington: Government printing office).—"United States Fish Commission. Report for 1883" (Washington).—"Smithsonian Report" for 1884 (Washington).—"My Voyage to the Cape," by W. Clark Russell (London: Chatto & Windus).—"How to use our Eyes," by John Browning. Fourth edition (London: Chatto & Windus).—"Journal of Royal Microscopical Society" (October).—Cole's "Studies in Microscopical Science."—"The Rochester Naturalist" (October).—"The Amateur Photographer."—"The Camera."—"The Scientific Enquirer."—"The Hoosier Naturalist."—"The Garner."—"The Naturalist."—"The Botanical Gazette."—"Journal of the New York Microscopical Society."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal."—"The Midland Naturalist."—"Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

Communications received up to the 13th ult. from: Dr. P. Q. K.—G. F. B., jun.—J. M.—F. G.—W. J. N.—G. K. G.—J. L. M.—C. P.—G. H. M.—J. W.—H. M.—E. L. —F. D.—Dr. J. W. W.—J. N. Y.—W. D.—J. H. N.—C. W. M.—C. D. S.—Dr. K.—W. H.—Rev. W. W. F.—J. B. M.—J. P.—G. A. N.—M. E. T.—J. R.—J. B.—P. Q. K. —F. S., jun.—D. M. H.—J. B. M.—A. P.—E. H. R.—D. A. K.—G. R.—G. R.—R. J. U.—E. H.—T. W.—S. A. B. —W. E. S.—Dr. A.—C. F. W.—W. L. A. C.—P. K.—W. S.—W. G. W.—J. S.—F. R. B.—C. E. G.—E. G. P.—W. G.—W. H.—B. H.—W. A. C.—W. M. R.—F. L.—W. H. B.—W. E. W.—E. A. S.—A. P.—T. F. M.—W. G. S.—T. W. W.—J. C. S.—E. W.—J. W. W.—J. W. E.—D. W.—J. W. P. K.—H. M. A.—R. H. W.—W. H. P.—L. F.—A. T. E.—I. G.—T. W. R.—J. A. F.—T. H. H.—E. B. F.—G. A. N.—M.—J. W. O.—W. T.—I. H. B.—P. T.—E. L.—T. B.—H. W. L. —T. W.—G. P.—T. J. P.—G. E. E., jun.—J. E. L.—T. A. L. J. L. H. W. C.—R. D.—Z. R.—H. N.—J. T. M.—T. G.—H. W. B.—J. E.—H. W.—G. A. N.—E. A. S.—&c. &c.

THE RE-AFFORESTING OF LONDON.

By E. A. PEAK.

WHILE cordially agreeing with Mr. Mattieu Williams's remarks on the desirability of this object, and the suitability of the plane for the purpose, I am unable to understand the advantages claimed for it, by reason of the shedding of its bark; neither do I think that the suggested test of its vitality, so far north as Sheffield, would be at all fair to the plane, and I question if any practical nurseryman would so recommend it. Bentley says: "The new layers of wood, the cambium layer, and the recently-formed liber, are the parts of an exogenous stem which are alone concerned in its active development and life." And I am inclined to think that its success as a town tree may be due more to its large smooth leaves, which prevents an accumulation of dirt from finding a lodgment, than to the shedding of the bark.

In 1860-61, twenty plane-trees were planted in the park here, which speedily grew into fine, healthy, smart-looking trees. During the winter of 1870-71, which was preceded by a wet autumn, the thermometer got down as low as 5° or 27° of frost, and most of them were killed, the remainder being much injured; the latter, however, made what may be called desperate efforts to recover themselves, and continued to do so, with more or less success, until the winter of 1880-81, when, under similar climatic conditions, every one was killed.

What may we learn from this?

The plane always grows until late in the autumn. Its wood has rarely time to properly ripen, which, in warm, wet, autumns, is intensified, and if a severe winter follows, injury or death is inevitable.

I may add we have only one healthy well-formed plane-tree of any size in the neighbourhood, and a few young ones in the streets, that are, as yet, doing fairly well; the remainder are in a wretched condition. It must be remembered that these remarks apply to the north of England only.

Hull.

THE TWO MIRRORS.

By W. J. N.

No. III.

HAVING acquired some knowledge of the behaviour of parallel rays after reflection from a concave mirror, we have next to consider how that knowledge may be made practically useful to us as microscopists.

On the table let us place the microscope; beside it the adjusting lamp, with blue glass chimney, and the bull's-eye condenser. On the stage of the instrument let us place some transparent object, and then set ourselves to illuminate the object by means of a pencil of rays to be first rendered parallel, and afterwards brought to a focus on the object by the concave mirror; it being assumed that the illuminating rays are to reach the object with no greater obliquity of direction than such as necessarily arises from their convergence (after reflection) to a distant focus.

Theoretically, we know that our purpose will be accomplished if we set the mirror in the axis of the microscope at the correct distance from the stage, and then throw upon it a pencil of parallel rays at a small angle of incidence, such as 30° (see last Art.). But in order to carry the theory into practice, it is evidently necessary to determine three things:

1. The correct distance in question, between object and mirror, to give a true focus.
2. The correct position and height of the lamp, to give the desired angle of incidence to the illuminating pencil.

3. The correct position of the bull's-eye to render parallel the diverging rays of the lamp.

1. The correct distance of the mirror from the object depends partly upon the curvature of the mirror. Assuming this to be unknown, we must ascertain the whereabouts of the "principal focus." It can be done thus: Place the microscope at one end of the table, and the lamp at the other end, taking care that the lamp-flame and the mirror are at the same height from the table. At that distance the rays will be fairly parallel. Turn the concave mirror so that it accurately faces the lamp. Take a narrow strip of thin paper, and hold it directly between the lamp and the mirror, at the distance of a few inches from the latter. Move the paper gently tc and fro, towards mirror and lamp alternately, until a position is found at which the sharpest image of the flame is projected from the mirror upon the paper. That point is the "principal focus" of the mirror. Measure the distance between strip and mirror; it is the principal focal distance. Double it; the product is the radius of the sphere, of which the mirror is a part.

Knowing the principal focal distance, the correct position for the mirror, when parallel rays are to be brought to a focus on the object, may be found for any angle of incidence thus:

Multiply the natural cosine of the given angle of incidence by the principal focal distance of the mirror; the product is the required distance between object and mirror.

A table of natural cosines is given in any book of mathematical tables, but the following short list, carried to three places of decimals only, will probably be all that the reader will require.

Angle of Incidence	30°	35°	40°	45°	50°	55°	60°	70°
Nat. Cos. of Angle	·866	·819	·766	·707	·643	·574	·5	·342

EXAMPLE: The small mirror represented in Figs. 158 to 161 (see last Art.) has a radius of three inches, so that its principal focal distance is 1·5. If we select the angles 30° and 60°, and multiply their cosines by 1·5, the two products are $·866 \times 1·5 = 1·299$, and $·5 \times 1·5 = ·75$. The correct distances for such a mirror from the object would be, therefore, $1\frac{1}{3}$ inch and $\frac{3}{4}$ inch, in the cases supposed. These are about the actual distances from D of the points of mean focus, F[1] and F[3], as found by construction in the Figs. 159 and 161 of the last Art.

The concave mirror of my own microscope is part of a sphere of eight inches' radius, its principal focal length being four inches. The following Table applies to it, and to all mirrors of like curvature.

Table of Foci for Parallel Rays of Oblique Incidence, after reflection from a Concave Mirror of 8 inches' Radius.

Angle of Incidence	30°	35°	40°	45°	50°	55°	60°	70°
Distance of Mean Focus from Centre of Mirror in inches and decimals of an inch .	3·46	3·28	3·06	2·83	2·57	2·3	2·0	1·4

If vulgar fractions be preferred, these lengths will be very nearly $3\frac{1}{2}$, $3\frac{1}{4}$, 3, $2\frac{4}{5}$, $2\frac{3}{5}$, $2\frac{1}{3}$, 2 and $1\frac{2}{5}$ inches respectively.

The reader should construct such a table for his mirror, and paste it inside his microscope-case.

Instead of bringing the rays to a focus on the object, it is sometimes better, as we have seen, to take advantage of the more oblique marginal rays by bringing the mirror somewhat nearer the stage, so that the object may be in the position occupied by *f* in Fig. 160, and dispensing with the diaphragm. In such a case the mirror may be set at about the tabular distance of the angle, which is 10° larger than the one actually employed.

In the present case oblique rays are, by supposition, to be excluded, and the angle of incidence is to be 30°. The correct position of our mirror of 8 inches' radius will, therefore, be at a distance of $3\frac{1}{2}$ inches from the object, and in the axis of the instrument. The reader will see the utility of filing small notches

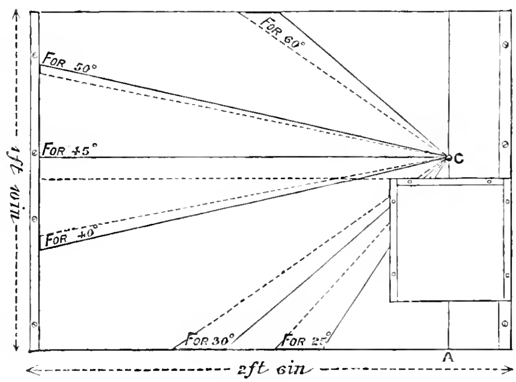


Fig. 166.

upon the stem which carries the mirror, to represent inches and half-inches of distance between the centre of the mirror and an object on the stage.

2. Having determined the position of the mirror, we have next to determine that of the lamp. This would in any case be comparatively easy, if we used our microscopes in a horizontal position; or, failing that, if we used no other angle of incidence than 45°. Directly we begin to tilt the tube, there is, with any other angle of incidence than 45°, an element of difficulty added. To simplify matters we must select some two angles of slope for the tube of the microscope, one of them being that which is most convenient for the microscopist himself, the other for friends whose height may differ from his own; and after a careful selection must employ no others. It will also save much time and trouble if we have some kind of tray beneath the instrument and lamp, on which lines may be drawn representing correct positions of the lamp, as determined by calculations now to be explained. Fig. 166 represents such a tray

constructed for my own use. It is formed of two pieces of wide ½-inch board (as indicated by dotted line across centre of figure) fastened together by cross pieces screwed across the ends. At right-hand end is a small platform for the microscope, raised 1½ inch (2 inches would be better) above the rest of the tray. On it the instrument can be moved forward and backward, but not sideways. The raised platform allows the mirrors, when in their lowest positions, to be set on a level with the lamp-flame, another important simplification of the problem we have in hand. The tray can be very easily put together by a little amateur carpentry.

Having such a tray, we must next select the two angles of slope for the tube of the microscope. In

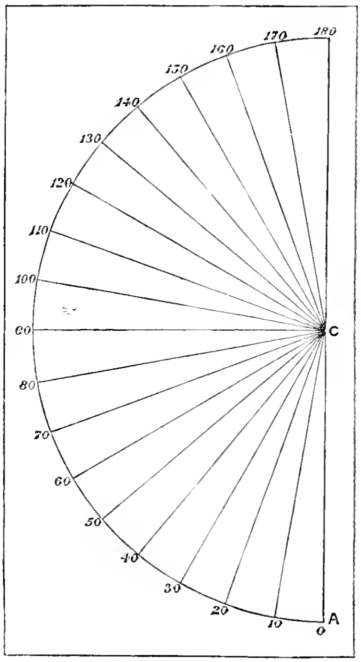


Fig. 167.

my own case angles of 40° and 30° with the surface of the table are found convenient. A thread with two buttons attached, can be hung beneath the tube, so that when either of the buttons just touches the platform, the instrument will be sloped at one of the two selected angles.

The complication arising from the tilting of the microscope will probably be the better understood, if, in the first instance, we suppose the tube to be in the horizontal position, and enquire how in that case we could assign the right position to the lamp. Remembering that any angle of incidence is equal to half the angle formed by the ray with the axis of the microscope (so long as the mirror itself is in that axis), we know that the illuminating pencil of parallel rays must (in the case supposed) form an angle of 60° with said axis. Having a sheet of cardboard ruled with the principal angles of a semi-circle (as in Fig. 167), instead of the tray before mentioned, we could place the microscope with its tube accurately over the line A C, and the centre of the mirror perpendicularly over the point C. The lamp could then be placed directly over some point in the line marked 60°, and be raised upon its pillar until a level line from the centre of the mirror passed just above the wick. The bull's-eye would lastly be placed in position, and our intention would have been carried out.

Now suppose the tube to be sloped to form an angle of 45° with the surface of the cardboard; its position remaining over the line A C, the centre of the mirror being again brought over the point C, and the lamp (lowered to the altered level of the mirror) remaining on the line marked 60°.

The incident pencil will no longer form an angle of 60° with the axis of the microscope, in agreement with the horizontal angle marked upon the cardboard, but one of about 69¼°. The angle of incidence upon the mirror will therefore be more than 34½° instead of the 30° we proposed to employ, and the mirror, as we have set it, will no longer bring the rays to a correct focus on the object. To get the desired angle of incidence, the lamp must be moved from the line 60° to that representing the horizontal angle of 45°.

Now for the reason. The reader must imagine three straight lines meeting in a point at the centre of the mirror:

(1) one passing up the centre of the tube, known to us already as "the axis" of the instrument, which call A;

(2) one passing along horizontally beneath the tube, which call B; and

(3) one passing horizontally to the lamp-flame, which call C.

A and B together form a plane angle (a) in the vertical plane passing through the axis. B and C form a plane angle (b) horizontally, that is, in a horizontal plane at right-angles to that of A and B, and on the left side of it; C and A together form a plane angle (c) obliquely, in a plane sloping upwards from C to A. These three plane angles meet at the centre of the mirror, and form there a solid angle (in shape like a ploughshare) of which they are the "sides."

It is evident that the oblique angle (c) must be larger than the horizontal one (b); but in order to decide how much larger, we need to discover the relations existing between the "sides" of the solid angle. They are the same as those of a right-angled spherical triangle. A simple formula borrowed from Spherical Trigonometry tells us that in such a case $\text{Cos } b = \dfrac{\text{Cos } c}{\text{Cos } a}$, in which formula a represents the selected angle of slope, c, the double of the selected angle of incidence, and b, the corresponding horizontal angle which we desire to line off upon the tray.

My own working angles of slope have been 40° and 30°. From the above formula it was easy to compute by logarithms the values of *b*, which are given in the following Table.

Table showing the Relation between (1) *the Angle formed by a ray with the Axis of the Mirror;* (2) *the Angle formed by that ray with the Axis of the Microscope;* (3) *the Horizontal Angle on the Tray* (*the mirror being in the axis of the Microscope*).

Angle with Axis of Mirror .	25°	30°	40°	45°	50°	60°	70°
With Axis of Microscope	50°	60°	80°	90°	100°	120°	140°
Horizontal Angle when slope is 40°	32° 57',	49° 15',	76° 54',	90°,	103° 0',	130° 45',	180°
When 30° .	42° 5',	54° 44',	78° 26',	90°,	101° 34',	125° 16',	152° 12'

By the supposition, we are proposing to throw our parallel pencil on the mirror at an angle of 30°. If the tube slopes at an angle of 40° with the horizontal, a line must be drawn on the tray representing a horizontal angle of 49° 15', and the lamp-flame be placed over that line. If the slope be 30°, another line must be drawn at an angle 54° 44', and the lamp be placed thereon.

The reader will now understand the lines marked upon the tray in Fig. 166. The continuous lines are for use when the tube is sloped at an angle of 40°; the dotted lines are for a slope of 30° only. He will observe that the difference of position in the different pairs of lines diminishes as the lamp approaches the rectangular position "for 45°," and there vanishes altogether; an important reason for preferring that position in our ordinary work. He will also notice that after passing "for 45°," the difference re-appears, but that the positions of the two lines are reversed. An examination of the Table will explain this change of position.

In lining out the tray, a black spot (C, Fig. 166) is to be first marked in the position most convenient for bringing the centre of the mirror over it when we slide the instrument on its platform. From it, lines are to be drawn, forming with a line A C, beneath the tube of the microscope, such horizontal angles as are given in the Table, or as may be calculated from the formula for other angles of slope than those to which the Table relates. Whenever the slope of the tube is altered, or the mirror is raised or lowered, the centre of the mirror must be again brought over the spot C, and the lamp must be altered both in height and position.

We have now settled the focal distance of the mirror, and the angular position and height of the lamp, but have not determined at what distance from the mirror the lamp should be placed. This can be more conveniently discussed in connection with our next subject—the correct position of the bull's-eye.

(*To be continued.*)

WE regret to have to record the death of Dr. F. Guthrie, Professor of Physics at the Royal School of Mines, at the comparatively early age of 53.

A WASP'S NEST.

HANGING outside my dining-room window, protected from wind and rain by the projecting woodwork, is a wasp's nest. Do not be alarmed, it is no headquarters of a busy crowd of irritable wasps, but the dainty home of a queen wasp, who, having survived the winter, set to work on the 3rd of June to found a new colony. In size, shape, and colour, it resembles a large walnut suspended by one end to

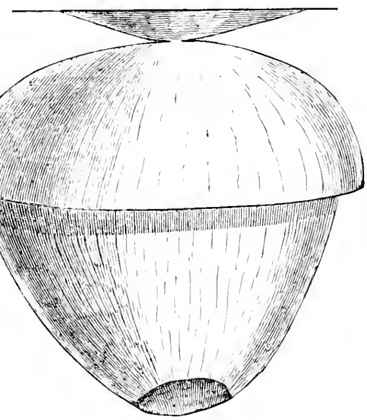


Fig. 168.—Wasp's Nest. Full size.

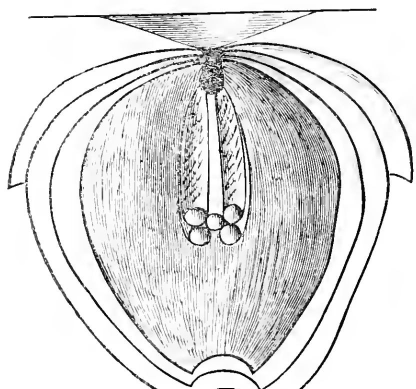


Fig. 169.—Section of Interior of Wasp's Nest.

the woodwork above the window, with an entrance at the other end. It is composed of comb, not made of wax like the bee's, but of very thin coarse paper, manufactured by the queen from decayed wood. She first suspended to the window frame by a firm stem the commencement of five cells, then she built round them, springing from the stem, a shell of the comb, leaving a small hole at the lower end. As soon as this was finished she again commenced from the stem a second shell, covering it almost, but not quite touching the first, leaving the entrance as before.

A third and half a fourth shell were added in the

same way to keep all warm and dry within. The manner in which she worked was most interesting. Taking the edge of the shell in course of construction, in her mouth, she quickly ran round it, adding to it, forming its shape at the same time. She worked day and night with astonishing rapidity, the whole nest being finished in three or four days. She next laid an egg in each of the five cells, and until they were hatched, most of her time was spent inside her nest, curled round the stem at the top of the cells, against its roof, as if to keep the eggs warm. When first hatched, she did not pay much attention to her family, although if, as she constantly did, she got inside our rooms, she was terribly anxious to get back to them, and fearing to kill her we allowed all wasps to go uninjured. As her family increased in size, her time was fully occupied, and on looking up into the nest, I could see she constantly enlarged the cells, to cover the fast growing bodies of the larva, as they hung suspended by their tails inside and wriggled about when she fed them or tenderly stroked them with her antennæ. When outside she was busy fly-catching stealthily hovering near flowers, and then suddenly darting forward and seizing some unlucky fly, she settled on some leaf close by and proceeded to tear off its wings and legs and to mangle its body, before flying with it to her nest. When full grown, each larva spins a little web over the mouth of its cell, and soon after emerges a full-grown wasp, ready to assist the queen mother to enlarge the nest, so that she can lay more eggs and can attend to the younger brothers and sisters.

L'AIGLE.

THE BLOOD OF COBRA.

I SEND a drawing of some blood corpuscles from a cobra which was exhibited at Titagur, near Calcutta, to enable a friend of mine to photograph a group of irritated snakes. The poison fangs had very recently been extracted from one of the specimens exhibited, and the wounds thus caused were still fresh. The snake-charmer drew some poison from the glands through the sockets of the extracted fangs, and this poison was brought to me. I examined it about thirty hours after it had been drawn from the gland, and by that time it had hardened into what looked like drops of dried gum-water. Dissolving this in a very little distilled water, I put single drops of the solution thus obtained on thin glass covers, dried it, stained it in fuchsin, and mounted it in balsam. On examination, I found numerous masses of what I consider micrococci, which, in my opinion, were probably generated in the poison after its extraction and before it dried. In addition to these were scores of blood corpuscles, from the freshly injured socket of the fang. These have taken the stain excellently, and as some of them seem to throw light on the structure of the nucleated disc, I have kept a record of them. *aa* are normal discs; *b* is a corpuscle which has been broken across the middle, along its shortest axis. The nucleus appears to be a solid body. The upper segment of the disc containing the cavity occupied by it before fracture, whilst the nucleus itself protrudes with an unbroken edge beyond the lower segment of the disc. *c* is a disc in which the circumnuclear has been folded down on one side, and this too is instructive; *d* is a corpuscle

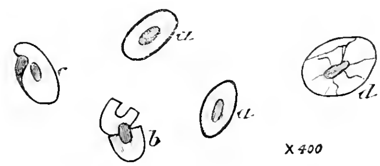


Fig. 170.—Blood Corpuscles of Cobra.

larger than the rest in which the fuchsin indicates a ragged nucleus, more probably a nucleus connected with the surface of the disc by protoplasmic extensions. Its size is noteworthy. I have given full details because the blood mounted by me in this case was mixed with cobra poison, and subject for thirty hours to its action, without the contour of the discs being in any way affected. Of course it was the snake's own blood. It only remains to add, that the objective I used was a Zeiss's D on one of Baker's Histological stands, and with a B eye-piece. My drawing was made with a Beale's neutral tinted glass.

W. J. SIMMONS.

Calcutta.

GOSSIP ON CURRENT TOPICS.

By W. MATTIEU WILLIAMS, F.R.A.S., F.C.S.

REINDEER HAIR.—A paragraph that has been "going the round" states that Herr W. C. Möller, a Norwegian engineer, has made important discoveries as to the buoyancy of reindeer hair. He finds that a skin rolled up with the hair inwards and weighing less than 4 lbs. will support for ten days the same weight as an ordinary cork life-belt. Used as a life-belt it has the advantage of keeping the wearer warm. He has constructed collapsing boats and sledges from reindeer skin, and life-belts filled with reindeer hair equal to those of cork. He finds that a suit made from reindeer hair, weighing little more than 1 lb. (½ a kilo.), will save a man from drowning even if it has been in the water for some time. It can be made of any thickness and is warmer than other materials. He is confident that suits made from reindeer hair will in time supersede those made from oilskin.

To those unacquainted with the substance in question, these statements may appear rather wild, but I am quite prepared to accept them with very little allowance, being well acquainted with it, and the uses to which it is applied by the Laplanders. The winter dress of these little people is of reindeer skin with the fur inside. A sort of tunic with sleeves that fit at the wrist; trousers of the same, terminating to soft top boots which are tied over the bottoms of the trousers to prevent inward leakage. Thus enveloped they sleep peacefully on wet ground or snow, and, as far as I could learn, coughs and colds are unknown among them. The patriarch of the encampment in the Trömsdal, a middle-aged man when I visited him in 1856, was hearty and vigorous; very little changed, when I paid him a second visit in 1874.

The hair of the deer upon which the buoyancy must entirely depend is white, grey or slate colour and very coarse, but soft. It is shed in the autumn and then hangs on the hide in loose patches. My attention to this was drawn by the diligence of the women in tearing off handfuls at the milking-time (3 A.M.) and carefully bagging it.

I sincerely hope that Herr Möller's expectations will be extensively realised, as a brisk demand at good prices, supplies a source of prosperity to these most amiable little people. I have just turned up a small quantity that I brought home with me in 1874, and have made a few experiments. I will report results when I have carried the experiments further.

School Ventilation.—At the last meeting of the British Association Dr. Carnelly read a paper in the Chemical section, on the Air of Dwellings and Schools. His general conclusion concerning the schools is that they are insufficiently ventilated, and that in many cases this is the true origin of some of the evils commonly attributed to over-pressure. This confirms the wisdom of my "guide, philosopher, and friend" the late George Combe, who so urgently advocated the practice of frequently turning the children out into the playground between their lessons, and opening all the doors and windows of the school in the meantime. I have tried it and found that only five minutes of such interval had a most refreshing effect both on the atmosphere of the school and the brains of the children. With modern school drill the five minutes may easily be turned to best account by occupying it in orderly and continuous marching or trotting, so that all shall exercise their muscles and respiratory organs, and none waste the precious interval in idle lolling.

The Sea-Serpent.—American papers tell us that two members of the United States Fish Commission have seen a sea-serpent in the Hudson, near Albany, N.Y. The names of the commissioners are not given in the report that I have seen. Possibly they refuse to give their names, knowing what will be the result if they do. They will be insulted as a matter of course, told indirectly that they are either fools or liars. Naval officers now refuse to make any statement concerning anything of the kind which they may see, and well they may, after the childish explanations which are commonly given by landsmen who pretend to have reached the limits of knowledge concerning marine animals. Professor Goode, on the other hand, thinks it possible that a large fish of reptilian shape, and yet unknown to science, may exist, and may sometimes lift its head to a considerable height above water. Others learnedly affirm that snakes are air-breathers, and therefore cannot live under water. This is a very profound remark. The creature that has been so frequently described, and with so little variation, must be a very long fish. When naturalists have discovered a physical or biological law which limits the possible length of fishes, they will be justified in contradicting the evidence of other men's senses, but not before. They should read the history of meteorites; how every account of the fall of such bodies, however well attested, was contradicted by all the learned until the beginning of the present century; then they should visit the mineral room of the British Museum and see the collection of these impossible things there displayed. Our children may possibly, in the course of next century, see in the adjoining room a complete articulated skeleton of the Kraken.

Acclimatisation of Plants.—Mr. Crozier, of Michigan University, states, as established fact, "that as plants move from the locality of their largest development towards their northern limit of growth, they become dwarfed in habit, are rendered more fruitful, and all parts become more highly coloured; their comparative leaf-surface is often increased, their form modified and their composition changed; their period of growth is also shortened, and they are enabled to develop at a lower temperature."

I may quote an example confirming this, which I observed with some surprise, viz. the successful cultivation of hops in Norway, where the summer is so very short, that, according to Kentish experience, the plants would have no time to arrive at useful maturity. Those that I saw growing were not so tall as in Kent, but apparently much more hardy, being less liable to the blighting troubles that so often destroy the hopes of our hop-growers.

The China grass plant (*Boehmeria nivea*) cultivated successfully in the neighbourhood of Lausanne, at an altitude of 1706 feet, by Professor Schnetzler, although it is a native of China and Sumatra, in latitudes between 15° and 35° supplies another example. The latitude of Lausanne is 46·31°. The mean temperature of Lausanne is 49° Fahr., and the winters very cold.

THE ANTIQUITY OF MAN.—Some of my readers may remember the discovery of the celebrated Neanderthal skull, and the discussions which it provoked. I am reminded of this by the discovery of two skulls of the same type, and evidently belonging to the same race of men, by MM. Puydt and Lopest (see October number of this Magazine, p. 237). The difference between the reception which has been accorded to the announcement of these two similar discoveries is very significant, and very encouraging to all who are hopeful of human progress. The discovery of the Neanderthal skull provoked quite a keen—not to say bitter—theological feeling. It was even asserted that the skull had been fraudulently deposited where it was found. The same with the "Abbeville jaw," which was subsequently discovered, March 28th, 1863. A very large number of abnormally good people were quite satisfied that such a discovery of the existence of human beings, so many tens of thousands of years ago, was an act of great wickedness, and that the conclusions of geologists concerning the antiquity of man would seriously undermine the public morality, if allowed to go abroad uncontroverted. Now we find a further discovery of the same kind, one which widely extends the range of Neanderthal type of men, and carries their antiquity still further back, is received with philosophic coolness, and the questions are not those of orthodoxy or heterodoxy, not whether or not human beings existed at the epoch indicated by the associated fossils; but what was the extent of the migrations of the "Neanderthal race," how far they penetrated the valley of the Meuse? Whether they made flint implements and utilised the tusks of the Mammoth; whether they baked the clay of their earthenware vessels; whether they buried their dead, &c.

TELEPHONE *v.* TELEGRAPH.—Many experiments have been tried, showing the great distance to which it is possible to work the telephone. This, of course, has a scientific interest; but the practical question is how far can it be commercially worked? This question has been answered by Dr. Wietlisbach. According to his estimate a telephone line, 1250 miles long, must cost above £50,000, and he tells us that it is possible to speak over this distance; but to make it pay, such a line must earn five shillings per minute, and hence a short conversation would cost two or three pounds. The telegraph works at about one-tenth the cost at such a distance. Up to about 300 miles the telephone beats the telegraph; at about 310 miles they run neck and neck, and over this distance the telegraph is the winner.

BALLOON PHOTOGRAPHS.—MM. A. and G. Tissandier and G. Nadar succeeded completely last summer in their balloon ascents, for the purpose of making aerial photographs. During the first ascent, on July 2nd, when they were in the air above six hours, thirty pictures of the country below were taken. They were instantaneous photographs, and twelve were quite satisfactory. Three good pictures were obtained on a second ascent; but it does not appear that copies have been published. A comparison of these pictures with maps of the same portions of the country will be curious. Assuming that the maps are correct, they will not exactly agree with the pictures, on account of the perspective. That part of the country, perpendicularly below the balloon, being nearer than the portions lying towards the horizon, the picture will represent the landscape as a circular plan on a scale continually diminishing from the centre to the circumference. This variation will be somewhat increased by the curvature of the earth.

THE LICK OBSERVATORY.—It appears from the published reports that $500,000 have already been expended upon the great 36-inch refractor and its appliances, leaving $200,000 for endowment. There is reason to hope that the difficulties in working the lens are at last overcome. Professor Holden declares officially, that "the real gift of Mr. Lick was to the world, and that the trustees will put the large telescope at the disposition of the world, by inviting its most distinguished astronomers to use it during certain specified hours every day, when the observatory staff will relinquish it to such visitors." This generous interpretation of their obligations by the Californian Trustees will doubtless be fully appreciated by all who are sufficiently educated to understand the advantages of the offer.

What strange reflections are suggested when we compare this piece of Californian news with that we usually received twenty or thirty years ago—with such pictures of Californian civilisation as those presented in "The Luck of Roaring Camp," &c. With such progress in so short a time, what must we anticipate for the future?

REFINED SUSCEPTIBILITY.—The Superintendent of the Government Museum of Madras reports a curious instance of superfine fastidiousness, which suggests comparison with some of our own genteel affectations. He notes that the native visitors object to the drinking-fountains in the grounds, owing to the resemblance that the discharge of water from a stoneware lion's head has to the act of vomiting. If I remember rightly, it was Dr. Johnson who perpetrated the enormity of taking a lump of sugar with his fingers, and so painfully disgus'ed his hostess, that she ordered the footman to remove the polluted sugar basin. The Hindoo gentry, who cannot drink the vomited water, are worthy rivals of this superior person.

PHOSPHOGRAPHY.—A paper was recently read on

this subject to the Academy of Sciences, by M. Ch. V. Zenger. He observed that Mont Blanc occasionally displays a blue-greenish glow long after sunset, and succeeded in obtaining a night picture of the mountain by means of this glow, which is highly actinic. This he did by projecting the images given by photographic lenses, in a dark chamber, on a glass plate coated with a layer of Balmain's phosphorus instead of collodion. After a short exposure thus, he removed the glass plate in the dark, and placed it in contact with a moderately sensitive dry photographic plate. After an hour of contact in the dark, a picture was found on the plate with all the details as in an ordinary photographic negative.

Something of this kind was done many years ago by Robert Hunt, but without the luminous paint. He placed newspapers in the dark in a drawer, covered with plain paper, and after a considerable time, found some sort of impression on the plain paper.

I am unable to find the original account of this, and only write doubtfully from memory. Perhaps some of the readers of SCIENCE-GOSSIP may possess the record, and be able to supply particulars.

TEETH OF FLIES.

By W. H. HARRIS.

No. II. *MYDÆ URBANI*, MEIG.

THE creature possessing the dental organs shown in the present illustration belongs to the large sub-family of the Muscidæ, known as the Anthomyiidæ. These flies may be distinguished from the more highly developed or typical muscidæ by the arrangement of the veins of the wings. The first posterior wing-cell is always fully open; the fourth longitudinal vein runs direct to the margin of the wing, without being bent upwards towards

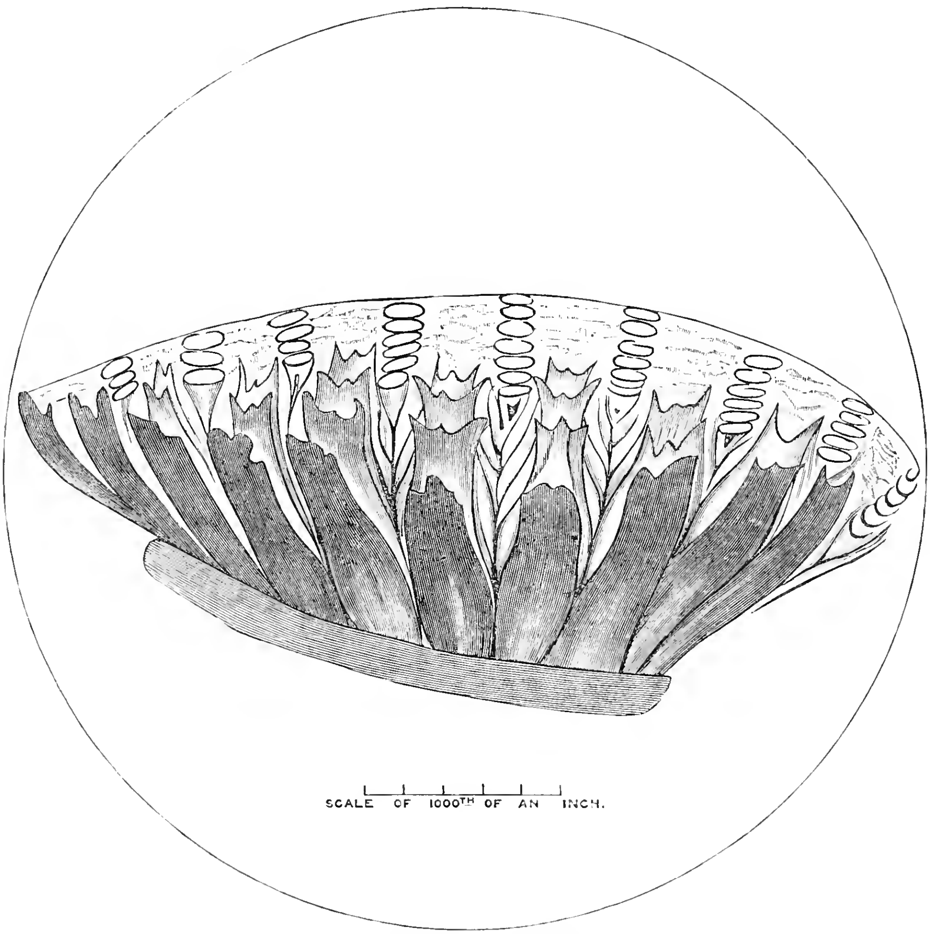


Fig. 171.—Teeth of Flies, *Mydæ urbani*.

the third longitudinal vein in a curve or angle as in the Tachinedæ and Muscidæ.

The Anthomyiidæ are separated from the various groups of smaller or acalypterate Muscidæ by the alulets or scales being more or less highly developed. (Ento. Mag. vol. 18, page 1.)

The general characters of the genus Mydæ as given by the same authority, at page 27 of the same volume, are as follow: viz. "Eyes bare, contiguous, or sub-contiguous in male, arista plumose; abdomen mostly oval, and always unspotted; alulets well developed, the under scale being much longer than the upper one: anal vein not prolonged to the margin of the wing."

The genus contains eleven species, which is sub-divided into two groups, according as their legs are wholly black or partly pale.

Mydæ urbani is a very common species, and may be taken freely in the neighbourhood of offensive matter, frequently near hedgerows during the summer months. It is a rather robust creature, being intermediate in size with the blow-fly and house-fly. The thorax is marked with several dark bands; the abdomen is of a greenish-brown shade; the basal portions of the wings and the alulets are ferruginous, and the legs have a similar hue.

The outline formed by the group of teeth found in this creature bears a strong resemblance to the shape of the group possessed by *Musca meridiana*, the basal portion being much longer than the generality of species exhibited, and is quite destructive in itself; the similarity, however, is not continued to the individual organs, these varying materially in form at their free edges.

The group is composed of ten primary teeth, and three subsidiary rows of seven, six and three respectively. No particular form can be assigned to the main set as they are subject to variation, not only among themselves, but also in different specimens. This variation however is so constant, that it may be looked upon as a leading feature in the dentition of this fly. When taken in conjunction with the trident-shaped terminations of the subsidiary rows, the laterals terminate with the usual blow-fly type, and the whole group is of a light clear amber colour indicative of medium strength.

Cardiff.

GULLS IN GARDENS.—Common gulls are very beneficial. A friend of mine who keeps several tame gulls allows them to run about in his kitchen-garden among his cabbages, where they do much good by eating the grubs. Ducks have been found of much use in clearing away such pests as caterpillars, but gulls have been found still more useful, because their beaks are better adapted to hunt for the insects among the folds of the leaves. They cause no injury to the vegetables.—*W. Harcourt Bath, Birmingham.*

THE FOOD HABIT OF *PETALOMONAS CARINATA*.

By DR. ALFRED C. STOKES.

IN the June issue of the 'Annals and Magazine of Natural History,' the writer described an interesting fresh-water infusorian, under the name of *Petalomonas carinata*, its most conspicuous character, and the one suggesting the specific title being the elevation of the dorsal aspect into a median longitudinal more or less keel-like ridge, the two sides of this roof-shaped surface sloping to the right-hand and left-hand margins respectively, and having at times a slight lateral concavity. The body itself is broadly ovate or suborbicular in outline, the ventral surface is somewhat concave, and the endoplasm, although granular, is transparent. The oral aperture is remarkably capacious, and the single flagellum appears to originate, I think it does in reality originate, within this oral fossa, an appearance conspicuous in all the species which I have seen.

Minute collections of what I have diagnosed to be

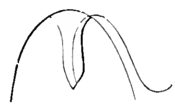


Fig. 172.—*Petalomonas carinata.*

partially digested food-particles are usually noticeable within the sarcode, but until recently I had not observed the infusorian in the act of taking food, and I was of course ignorant of its favourite diet. The mode of obtaining nourishment is so interesting, and in some particulars so inexplicable, that I desire to call attention to it, hoping that those accustomed to work with comparatively high magnifying powers ($\frac{1}{15}$ and $\frac{1}{16}$ objectives for instance), may meet with the animalcule, and may be able to explain what to the writer is rather obscure.

When the petalomonas finds a spot richly supplied with minute bacilli, it comes to rest. The flagellum is then thrown around to one side of the body, the base being apparently strained against the edge of the oral aperture, the entire lash, with the exception of the free extremity, being practically motionless; the distal end alone vibrates in quite regular, almost rhythmical beats. The effect of these quick movements is that the bacilli are dashed against the motionless portion of the flagellum, down which they involuntarily glide to the oral fossa. Here they frequently regain their liberty, darting in and out of the aperture or collecting around the margin like flies around a honey-drop; occasionally they dart away and out of the field. Yet there is usually quite a steady flow of bacilli in almost Indian file down the basal part of the flagellum, or across the somewhat

conical posterior portion of the oral fossa into the endoplasm, a narrow channel often there opening to receive and to conduct them, at times, to the posterior part of the body. Bacilli and minute spirilla in their headlong course striking the curved flagellum at any part of its length are, in some strange way, deflected to the oral aperture, and are usually sooner or later engulfed.

But unless their momentum is sufficient to carry them to the point of insertion of the flagellum within the oral fossa, they will swim out of the aperture, and voluntarily return again and again. This sporting with fate may continue long and be followed by no disastrous result, unless the bacillus comes in contact with the slightly oblique posterior wall of the oral fossa, when it seems to become helpless; it then invariably glides forward and into the animalcule's endoplasm. These posterior walls are not membranous and fixed, but soft, and dilatable at the infusorian's will. The creature at intervals makes mimic pharyngeal gulps, but, as a rule, food is not then swallowed; the bacterial procession is at that time interrupted. Still the distal end of the curved flagellum lashes the water, the delicate bacilli swarm around the oral aperture; they hurry in, they hurry out; singly they pass beyond the fatal orifice, a shining path opens before them, and into the substance of the hungry petalomonas they enter, to leave it only as granules and shapeless fragments.

What is the attraction at that mouth-margin which these bacilli shall find so agreeable that, after their sudden slide down the flagellum, they shall there swarm like gnats in the summer sun? Is there any special attraction? They may be only following that impulse that leads them to congregate in a cloud around almost any stationary object. And arrived at the rearmost obliquity within that gaping mouth, why not turn and swim again into the open; why, without apparent effort or movement on the infusorian's part, should they slip onward and be engulfed? There are no minute cilia, or any hidden flagellum to explain the final act. But the short posterior oblique plane leads to the oral aperture proper, and a plausible explanation of the inability of the bacillus to escape from the region may perhaps be found in the ease with which an object can move down an incline, the bacillus being assisted by its own flagella. It is also possible that this adoral plane may be a sensitive surface; and it may have the power to voluntarily alter its angle of inclination so as to more readily direct the food particles to the mouth, the surface being so minute that the change of position eludes observation.

Those naturalists who are so fond of dilating on the intelligence of animals, may accept this little creature, the $\frac{1}{1000}$ inch long, as an example of the superiority of infusorial mind over bacterial matter, and conclude that as the animalcule evidently knows when it arrives at a bacterial region, so does it evidently also know that by lying still with permanently opened oral aperture, and with gently throbbing flagellum, those senseless plants will swim in and finally be taken in; so why go to the trouble and expense of tissue formation to develope contractile lips or protrusible pharynx, when experience teaches that bacilli are good, nutritious and easily captured? Having once accidentally taken a single bacillus by not trying, and finding it agreeable to continue to capture bacilli in the same way for all time, is it not an evidence of intelligence? But the intellect of *Petalomonas carinata* must be left to the reader for further investigation.

The figure is a diagram of the anterior part of the neutral surface, showing the position of the flagellum while the infusorian is taking food.

Trenton, New Jersey, U.S.A.

ASTRONOMY AND METEOROLOGY.

By John Browning, F.R.A.S.

A NEW comet was discovered on the 5th of October by Mr. Barnard, at Roshville, Tenessee. It is bright and round, and when discovered it was in the constellation Sextans, moving towards the south-eastern part of Leo. It is approaching the earth, so that its brightness at the end of October was about three times as great, and at the end of November about ten times as at the time of its discovery.

Professor C. H. F. Peters has discovered another small planet at Clinton, N.Y.; and Dr. J. Palisa discovered two at Vienna, on the 3rd of November. Two hundred and sixty-three of these bodies are now known; of these Professor Peters has discovered forty-five, and Dr. Palisa fifty-seven.

Professor Kruger states that the perihelion passage of Barnard's comet will take place on the 16th of December, at the distance from the sun of 0.66 of the earth's mean distance.

Dr. E. Lamp finds that the comet will be nearest the earth in the first week in December, when it will be twenty-four times as bright as at the time of its discovery.

The annual report of the Pulkowa Observatory has been issued by Professor Struve. In the physical department, Herr Hasselberg has obtained a large number of photographs of the solar spectrum and determined the position of several new lines which they contain. A new refracting telescope which has an object-glass 30 inches' diameter has been mounted in the observatory. With this it is believed some further changes have been noted in the famous star in the great nebula of Andromeda.

On December 19th, there will be an occultation of γ^1 (gamma) Virginis, magnitude $2\frac{1}{2}$. The disap-

pearance takes place at 1 hr. 50 min. 74° from the vertex; the reappearance at 2 hrs. 34 min. morning, 170° from the vertex.

Rising, Southing, and Setting of the Principal Planets at intervals of Seven Days.

	D.	Rises. h. m.	Souths. h. m.	Sets. h. m.
MERCURY ☿ .	3	7 43M	11 51M	3 59A
	10	6 28M	10 54M	3 20A
	17	6 4M	10 29M	2 54A
	24	6 13M	10 27M	2 41A
	31	6 34M	10 56M	2 38A
VENUS ♀ . .	3	7 47M	11 50M	3 53A
	10	8 7M	0 1A	3 55A
	17	8 21M	0 11A	4 1A
	24	8 33M	0 22A	4 11A
	31	8 39M	0 33A	4 27A
MARS ♂ . .	3	10 21M	2 11A	6 1A
	10	10 13M	2 7A	6 1A
	17	10 2M	2 3A	6 4A
	24	9 52M	1 59A	6 6A
	31	9 38M	1 54A	6 10A
JUPITER ♃. .	3	3 41M	8 56M	2 11A
	10	3 21M	8 33M	1 45A
	17	3 0M	8 10M	1 20A
	24	2 38M	7 47M	0 56A
	31	2 16M	7 23M	0 30A
SATURN ♄. .	3	6 40A	2 46M	10 48M
	10	6 10A	2 17M	10 20M
	17	5 41A	1 48M	9 51M
	24	5 10A	1 18M	9 22M
	31	4 39A	0 48M	8 53M

In December, Mercury will be a morning star after the first few days of the month.

Venus will be an evening star towards the end of the month. Mars will be an evening star. Saturn will be almost stationary in Gemini.

On December 21st, the Sun enters Capricornus, and Winter commences at 9 hrs. in the afternoon.

Meteorology.—At the Royal Observatory, Greenwich, the mean reading of the barometer for the week ending the 23rd of October was 29.51 in. The mean temperature of the air was 49 deg. 2, and 1.4 below the average in the corresponding week of the 20 years ending 1868. The direction of the wind was variable, and the horizontal movement of the air averaged 7.7 miles per hour, which was 3.4 below the average in the corresponding week of 16 years. Rain fell on two days of the week to the aggregate amount of 0.07 of an inch.

For the week ending October 30th the mean reading of the barometer was 29.98 in. The mean temperature of the air was 50.5, and 2.0 above the average in the corresponding weeks of the 20 years ending 1868. The general direction of the wind was easterly, and the horizontal movement of the air averaged 13.3 miles per hour, which was 1.9 above the average in the corresponding week of 16 years. Rain fell on four days of the week to the aggregate amount of 0.13 of an inch.

For the week ending November 6th, the mean reading of the barometer was 29.62 in. The mean temperature of the air was 48.9, and 2.6 above the average in the corresponding weeks of the 20 years ending 1868. The general direction of the wind was S.W., and the horizontal movement of the air averaged 12.8 miles per hour, which was 1.3 above the average in the corresponding week of 16 years. Rain fell on five days of the week to the aggregate amount of 1.19 of an inch.

For the week ending 13th of November, the mean reading of the barometer last week was 29.33 in.; the mean temperature of the air was 42.9 deg., and 0.6 below the average in the corresponding weeks of the 20 years ending 1868. The direction of the wind was variable, and the horizontal movement of the air averaged 9.9 miles per hour, which was 1.8 below the average in the corresponding week of 16 years. Rain fell on five days of the week, to the aggregate amount of 1.37 of an inch.

The mean air temperature for December is 41° for Edinburgh, 42° for Berwick, 43° for Hull, Norfolk, Suffolk, and London, 44° from Canterbury to Cardiff, and 45° along the South coast.

The average rainfall for December from Sunderland to London is 2 inches, along the South coast it is 3 inches, and on the West coast it ranges as high as 4 and 5 inches. The last-named rainfall would equal nearly 520 tons of water to each acre.

A CHAPTER ON FOSSIL INSECTS.

PERHAPS no branch of palæontology has been so much neglected as that which relates to the fossil remains of insects. Recently, however, the labours of such zealous workers as Professor Heer, in Europe, and Mr. Scudder in America, have added considerably to our knowledge of this branch of science, and it may not therefore be altogether without interest for us to pass briefly in review what is at present known about fossil insects and the geological age of their several Orders.

The oldest remains of insects which have as yet been discovered belong to species allied to the Neuroptera, and consist only of a few fragments of wings discovered by the late Professor C. F. Hartt in some Middle Devonian shales on the coast near the city of St. John, New Brunswick, all of which have been carefully figured and described by Dr. Dawson and Mr. Scudder. These fragments are specially interesting on account of the synthetic character they exhibit; that is, the combination in each individual case of features now characteristic of different families. For example, one of the oldest of these insects (*Xenoneura antiquorum*) exhibits traces

of having possessed a musical or stridulating apparatus, similar to that of modern crickets, thus combining a feature found in the Orthoptera with the wing venation and other characteristics of the Neuroptera; another (*Homothetus fossilis*) unites peculiarities now found in the May flies and dragon flies; while a third (*Platephemera antiqua*), which must have been a gigantic sort of Ephemera or May fly, measuring five inches in expanse of wing, also exhibits similar synthetic features. Although these are the oldest insect remains yet discovered, there is of course no sound reason why, in the older rocks, such remains may not in future be found older than these Devonian insects just mentioned. In the rocks of the succeeding carboniferous period the Neuroptera are represented by the remains of several species of Termites or white ants, insects which, despite their name, have nothing in common with the true ants, but possess a much nearer relationship to the cockroaches, with which insects they were more closely allied in former times than now. Some very large species of May flies, one measuring seven inches in expanse of wing, have also been found in the coal formations of America. An interesting insect from an ironstone pit of Permian age at Schwarzenbach in Germany has been described by Dr. Dohrn, under the name of *Eugereon Bockingi*, which that naturalist considers as not being referable to any existing Order, combining as it does characters of the Neuroptera and Hemiptera, thus forming one of the most interesting of the old synthetic type of insects. During the Mesozoic period dragon flies evidently became very plentiful. First occurring in the Lower Lias marls of Schambelen, Switzerland, a beautiful and large specimen from which place (*Æschna Hogeni*) is described and figured by Professor Heer, they are found in great plenty in the several Oolitic formations, particularly in the Solenhofen slate of Bavaria, where some gigantic species measure eight inches in expanse of wing, and four inches in length of body; while in the dried-up Miocene lake of Œningen, in Switzerland, they occur abundantly both in the larval and mature state. Other families of Neuroptera, including those beautiful and delicate lace-winged flies, the Hemerobiidæ, the "snake flies," or Raphidiidæ, the Myrmelons, etc. etc., make their first appearance in the Mesozoic period and continue to be found in Tertiary deposits up to the present time.

Next in antiquity to the Neuroptera come the Orders Orthoptera, Hemiptera, and Coleoptera, all of which date back to Carboniferous times. We will now very briefly trace the geological history of each of these Orders separately.

(1.) Orthoptera. By far the most numerous, and probably the oldest remains of this Order belong to the Blattidæ or cockroach family, above fifty species of which have been obtained from the coal beds on both sides of the Atlantic. The coal formations have also yielded remains of orthopterous insects allied to the crickets, grasshoppers, and mantids, a fine specimen resembling the latter (Lithomantis) having been discovered in Scotland, while on the continent a species of Phasma has also been found in the coal measures. In the Mesozoic formations, cockroaches, locusts, grasshoppers, and crickets, occur in plenty; and in the Eocene rocks of the Isle of Wight, Gryllotalpa, or the mole cricket, makes its appearance, since which time it and the others have continued to the present day.

(2.) Hemiptera. The two oldest representatives of this Order come from the coal measures of Saarbruck, and belong to the genus Fulgorina. Two other species of the same genus also occur in the Permian rocks of the continent. In the Liassic and Oolitic rocks the genera Cicada, Cimex, Nepa, Notonecta, etc., and several of the different forms of land and water bugs, occur abundantly, and these continue through Kainozoic times, some of the water bugs from the Upper Miocene of Oeningen being very large in size. Aphides also come in towards the close of the Secondary period.

(3.) Coleoptera. Beetles also date back to Carboniferous times. Two fossils are extant of that age; one, a species allied to Curculio, from the ironstone of Coalbrook Dale, Shropshire, and the other a Troxites, from the coal measures of Saarbruck. Coming to Mesozoic times, the Trias furnishes us with three species from the Keuper of Vadutz, while from the Trias of North America we have, on the testimony of Mr. Scudder, a fossil coleopterous larva. In the Rhætic beds of England and Sweden remains of Coleoptera occur in greater numbers, while in the Lower Lias marls of Schambelen, Switzerland, which have furnished such a rich harvest of fossil insects to the researches of Professor Heer, by far the greater proportion of such insects belong to the Coleoptera, a fact due doubtless in some measure to the favourable conditions for preservation afforded by the hard wing-cases of beetles. These fossil Coleoptera include wood beetles—the Buprestidæ and Elateridæ occurring in great numbers—leaf-eating beetles, such as the Chrysomelidæ, etc., carnivorous beetles, including small Carabidæ and Telephoridæ, and water beetles, including small Gyrinidæ and Hydrophilidæ. Some of these remains are also specially interesting on account of the light they throw upon the existence of other forms of life at the time. For example, several genera of beetles are found whose representatives now feed on fungi and mosses, thus indicating the existence of fungi and mosses at that time in the neighbourhood, although these have not yet been found in the same formation. The occurrence of a dung beetle also furnishes, according to Professor Heer, indications of the existence of small mammalia, although no such remains have as yet been found. In the Upper Oolitic formations, comprising the Purbecks of England, and the Solenhofen slate of Bavaria, the same families of beetles also occur, along with some

new ones, such as the "lady birds" or Coccinellidæ, the Staphylinidæ, etc. A few elytra or wing cases of beetles form the only insect remains which have been discovered in the deep sea cretaceous or chalk beds. Coming to Kainozoic times, in the Eocene deposits, the London clay furnishes us with elytra of Curculios and Elaters, the Upper Eocene beds of the Isle of Wight give us Dytiscus, Anobium, Dorcus, etc., while at Aix, in Provence, a vast number of species belonging to over fifty genera (including the noble Cerambyx) have been found. In the Miocene formations of the continent the remains of Coleoptera become too numerous to mention, gold beetles, liliaceous feeders, Buprestidæ, etc., occurring in the greatest profusion, together with feeders on the excrement of cattle, these implying the existence of cattle at that time. Fossil remains of twenty species of Coleoptera have been discovered in the Miocene of Spitzbergen, seven in that of Greenland, and in the last Arctic expedition a fossil beetle was brought home from the Miocene shales of Grinnell Land, and has been named by Professor Heer *Carabites Fieldenianus*, after Major Fielden, the naturalist to the expedition. The occurrence of these remains in the Arctic regions points to a time when the climate there was quite a temperate one, an inference which is fully corroborated by the beautiful fossil flora which has been obtained from the same localities. In the succeeding Pliocene and Post-Pliocene formations of England and the continent remains of Coleoptera continue to abound, especially in the lignites of Utznach, and Durnten in Switzerland, where the beautiful little green and blue Donaciæ occur in great profusion, some of the species being identical with those now living in Switzerland. Fossil remains of living species have also been found in lake deposits and other recent geological formations, forming interesting connecting links between the Past and the Present.

We have now briefly traced the geological history of those Orders of insects which date back to Palæozoic times. In another paper we propose to deal in a similar manner with the remaining Orders.

ROBERT B. COOK.

SCIENCE-GOSSIP.

THE following suggestion has recently been made by Mr. J. A. Ryder, the well-known American naturalist: "Structures which are disappearing should be called vestiges. Structures which are still imperfect, but are appearing, ought to be called rudiments. As it is, the word rudiment is usually misapplied, so far as concerns its literal sense, when speaking of 'rudimentary organs.'"

IT is intended to hold a meeting of the various scientific societies in Australia and New Zealand in 1888 (the one hundredth anniversary of the foundation of the colonies), upon the lines of the British Association meetings, and to form an "Australasian Association for the Advancement of Science," with similar aims and objects. The general committee or council will be composed of delegates from the different colonies or colonial scientific societies. The number of delegates from each society or colony is to be proportionate to the number of members from the particular colony or societies taking part in the proceedings. If the general committee be established on the basis suggested, viz. one delegate to each hundred members or less, the total number of such representatives would be about twenty-five or thirty, since there are some twenty scientific societies in the Australasian colonies, and the number of members is between 2,500 and 3,000. To the seven sections corresponding to the seven of the British Association, there will be added: H, Medical and Sanitary Science; I, Literature and the Fine Arts; J, Architecture and Engineering.

MR. H. A. PAGE has for some time past been engaged in collecting "Animal Anecdotes," arranged on a new principle, and his book will shortly be published.

ON the 6th of October, Mr. John S. Harrison expired at Malton, in the fortieth year of his age. During many years the deceased gentleman was resident in Hull, and was deeply interested in microscopic science. Many friends, in addition to those more closely connected with Mr. Harrison, in Hull and Malton, will learn with regret of the loss of a genial and sympathetic companion and correspondent.

IT is with much regret we have to announce the sudden death of an old and valued contributor, the Rev. W. Downes, F.G.S. In our November number appears the last of his literary work—"A Miscellaneous Ramble in Devon." Mr. Downes was an enthusiastic geologist and botanist, and was much beloved by all who had the privilege of his acquaintance and friendship.

THE Geologists Association held their opening meeting, at University College, Gower Street, W.C., on Friday, November 5th, when an address was delivered "On the Erosion of the Coasts of England and Wales," by the President, W. Topley, Esq., F.G.S., of the Geological Survey of the United Kingdom, Secretary of the British Association Committee on Coast Erosion.

DR. C. W. KIMMINS has delivered a very important lecture before the Leys Natural History Society on the Discovery of Human Bones, Pottery, &c., at Hauxton Mill, near Cambridge. The skulls are neolithic, and Dr. Kimmins is of opinion that this "find" proves that neolithic men must have lived on into historic times.

The Dover Field Club held a most successful conversazione at the Town Hall on November 3rd, which aroused much public attention. The Society has also commenced a series of public lectures on popular science, the first of which was delivered by J. E. Taylor, F.G.S., Editor of Science-Gossip, on November 24th. Subject: "Earthquakes and Volcanoes."

Dr. Taylor also lectured, during November, before the Winchester College Natural History Society, on November 3rd, subject: "The Story of a Flint Pebble"; at the Chelmsford Museum, November 10th, on "Fossils"; at Saffron Walden, on "Microscopical Animals" (November 8th); at Alton, on "Flowers"; at Hadleigh, on "Flowers and Fruits"; at Halesworth, on "The Great Ice Age," &c.

Mr. R. Miller Christy, F.L.S., is about to publish a work on the Origin and Meanings of the Public House, and other signs found in the county of Essex.

The Croydon Microscopical and Natural History Club held a very successful soirée on Wednesday, November 17th.

The Forest Hill Scientific and Microscopical Society have introduced a series of "Science Gossip" nights into their winter nights' programme.

We have received No. 75 of Mr. William Wesley's useful Natural and Scientific Book Circular.

A "Potato Conference" is to be held on the 2nd and 3rd of December.

We have received from Mr. H. Vial, of Crediton, some of his newly-brought-out slides of pathological and botanical preparations. They are remarkable for their neatness, as well as for their scientific usefulness.

MICROSCOPY.

Pyritised Diatoms.—Dr. Julien writes as follows in the "New York Microscopical Society's Journal": "I think you will agree with me, on an examination of several preparations of these diatoms, that the following points of mineralogical interest are established:—First, that the material referred to by all writers under the broad name of pyrites, consists substantially of the single mineral pyrite. To determine this point, I searched for minute cavities in which the substance might have found opportunity to crystallise, and discovered not only minute drusy surfaces, but also little spherules covered by projecting crystals. The globules which Mr. Kitton detected, appear to have been round and smooth, probably concretionary. On those exhibited may be seen triangular faces, which appear to belong to octahedra; these crystals must therefore consist of pyrite. This conclusion will be confirmed by a glance at the slide on which is mounted a crystalline crust from a specimen of fossil fruit, converted into pyrites from the London clay at the Isle of Sheppey. This drusy surface shows distinct, sharp octahedra of larger size, so that this crystalline form probably prevails in the pyrite crystals throughout the London clay. Second. The true colour of the pyrite films, when examined on a fresh cross fracture, appears to be a grayish-white. This indicates that the crystals are far from pure, probably mixed with a large proportion of marcasite. Third. The incipient decomposition of the mineral is characteristic of the presence of marcasite, beginning with a golden yellow tarnish within, and assuming a bronze colour without. As the decay progresses, the valves become covered by a reddish film of iron oxide, and finally, the entire material passes into reddish-brown iron-ochre, sometimes blackened as if by the intermixture of oxide of manganese. The mode of deep subterranean decomposition is, therefore, hepatic, and vitriolescence is never observed in these altered diatoms; although the latter form of decay attacks the nodules of pyrites lying nearer the surface in the London clay, at other points along the Thames, as at the Isle of Sheppey. In conclusion, I may state that I have found in the study of pyrites, many rich and interesting fields of investigation in which the testimony of microscopical observation has proved indispensable."

To Sharpen Razors for Section Cutting.—In the "Scientific Enquirer," Mr. V. A. Latham says:—"The simplest method of sharpening a razor is to put it for half an hour in water, to which has been added one-twentieth of its weight of (H Cl) hydrochloric acid, and water (which is muriatic acid), or sulphuric acid, then lightly wipe after a few hours; set it on a hone. The acid here supplies the place of a whetstone, by corroding the whole surface uniformly, so that nothing further than a good polish is necessary. The process never injures good blades, while badly hardened ones are frequently improved by it."

ZOOLOGY.

The Extirpation of Lepidoptera.—The more striking species of lepidoptera seem doomed to a speedy extinction, as far as Britain is concerned. As lately as three years ago the six-spot burnet (*Zygaena filipendulae*) was fairly common in the neighbourhood of Edmonton. Now, prolonged and repeated search is needed to espy a solitary specimen. Before the operations of the so-called "conservators" of Epping Forest began, *Euchelia Jacobaeae* was to be met with in a low, moist part of the forest, not very far from

Chingford Station. This season it has been repeatedly searched for in vain by some zealous lepidopterists. The same insects have been almost, if not quite extirpated at Bogner, where they were formerly rather common. At Epping Forest the disappearance of thickets is due in part to the draining operations of the conservators, and to the removal of the undergrowth, which admits the wind into nooks formerly well sheltered and warm. But elsewhere we must trace the mischief to the number of boy-collectors who have been induced to try their hands at butterfly and moth catching, and who get hold of a number of specimens, so then after a season or two give up the pursuit. We cannot have too many observant naturalists, but we have already far too many mere collectors.—*J. W. Slater.*

British Slugs.—I only saw the September number of Science-Gossip a few days ago, and wish now to fill in a slight gap in Mr. Williams's paper (Science-Gossip, No. 261, p. 202) anent *Testacella haliotidea*, var. *Campanyonii*, Drup. *T. Campanyonii* was described in Dupuy's "Hist. Nat. France" (1847), p. 47 (t. i., f. 3), from a single shell sent by Campanyo. Mr. Williams is, however, I suspect, unaware of Dr. Campanyo's "Hist. Nat. des Pyrénées Orientales," published in 1863, which contains a full description of the animal from a specimen (the fourth) taken at S. Martin-du-Canigou in 1854. It is described as, "d'un vert jaspé de points irréguliers noirâtres qui deviennent plus nombreux en s'éloignant du centre, finissant par se réunir et former sur les côtés du corps des lignes longitudinales noires interrompues . . . " Foot, bright yellow; upper tentacles, greenish. Campanyo rejects Moquin-Tandon's reference to *T. haliotidea.* Certainly, in point of size, the variety must be abnormal, the dimensions given for the shell being 17 mm. × 8 mm.; the size of the animal is not mentioned. I think the above is interesting as an annexe to Mr. Williams's paper.—*Brockton Tomlin, Pembroke College, Cambridge.*

Another Use of Bees' Stings.—In connection with Mr. Williams's interesting paragraph under the above heading, in the October number of Science-Gossip, it is interesting to compare the sting of bees (*apis*) with those of wasps (*vespa*). The former having to perform the double function of weapon and inoculator of honey-cells, loses somewhat of its usefulness for the former in its adaptation for the latter purpose. In highly magnified representations of a bee's sting, and the point of the finest cambric needle, Dr. Dallinger recently showed that the needle would not bear comparison with the sting for exquisite smoothness, taper, and fineness. Probably this extreme fineness is to enable the sting to pass through the covering of the honey cells without making a hole sufficiently large for the passage of air to the honey. The sting of the wasp, on the contrary, being, so far as we know, only for use as a weapon, does not require modification for any secondary purpose, and its Designer is therefore enabled to expend the utmost of His ingenuity on its construction. When examined under the microscope, it is seen that instead of the smooth, finely-tapered sting of the bee, the wasp is armed with a most fearful weapon, provided with alternate barbs, affixed in such a manner that, although the sting can be driven into a foe or victim without the barbs offering any resistance to its entry, they come into operation immediately the sting commences to be withdrawn (somewhat in a similar manner to the movable barb of a harpoon), whilst their alternate situation provides that immediately the upper barb ceases to act, a lower one comes into operation. Such a design as this would tear the covering of a cell all to pieces, although it renders the sting of the wasp an infinitely superior weapon to that of the bee. —*Thomas Winder, Sheffield.*

BOTANY.

Fertilisation of Maize.—Can any reader tell me how the seed of the maize (Indian corn) is fertilised? The male flower at the top of the stalk is so far removed from the cob which contains the seed, and the latter is enveloped in a whorl of leaves, that I cannot imagine how the pollen reaches its destination. Have the long thread-like hairs which project from the end of the cob, any part in the business? I fancied that perhaps the pollen might fall upon these, and ascend by a kind of capillary attraction to reach the seed, or is the function assisted by insects? Any information will be gratefully received.—*R. H. Nisbet Brown.*

Channel Islands.—The plant about which Mr. Epps inquires on p. 262, known in Guernsey under the name of wild rhubarb, is *Gunnera scabra*, a subtropical species belonging to the same natural order as the common ivy. It is remarkable for the enormous size of its leaves, which often attain a diameter of seven or eight feet. It has become thoroughly naturalised in various places in the island. I knew it in the beautiful valley of Moulin Huet quite twenty years ago, but how long before that it was planted I cannot say. A number of other exotic plants may here and there be found, growing apparently wild in the Channel Islands, originally escapes from gardens probably, or else purposely planted out in suitable spots. The mild climate suits them, and they thrive. The mesembryanthemum grows not only in the Channel Islands, but also about the Land's End in a semi-wild state, and blossoms freely.—*E. D. Marquand, Alphington, Exeter.*

Channel Islands.—The locally-called "wild rhubarb" (*Gunnera scabra*) was brought from Mexico in 1851 by Mr. Henry Dobrée, of St. George, Guernsey, and was planted at the Vallon by Mr. Carey in 1853, and has flourished there ever since. The plants noticed in the glen leading down to Moulin Huet Bay are seedlings from the original plant in the Vallon Garden.—*M. Daubre, Guernsey.*

Erica ciliaris.—Mr. Porter, in his graphic description of that splendid plant, the *Erica ciliaris*, has stated that it is not entirely confined to Cardew; in that he is correct, for I can inform enterprising botanists that they have no need either to trouble the owner of Cardew or his pheasants, as they can find the plant for themselves flourishing plentifully on moory ground in more than one spot both north and south of Truro, not far from that city; at least it was so in the years 1873 and 1874, when I gathered it. I also found growing along with it, in one locality to the south, that very pretty hybrid variety, *Tetralix ciliaris.* Although Mr. Porter has by no means overrated the beauty of ciliaris, yet I think it hardly yields in elegance to its congener, *E. vagans*, growing, as the latter does, in such masses that it is worth taking a journey to its habitat (or one of its habitats, for I have only seen it there), near the Lizard, if for nothing else than to see it in full bloom in the month of July.—*J. W. D. Keogh.*

GEOLOGY, &c.

The Palæontological Society.—We are sorry to see that this, one of the oldest and most useful of scientific associations, is in peril of its life for lack of funds. For more than thirty years its annual volumes, describing British fossils, have increased in value. The yearly subscription is one guinea, for which each subscriber receives the large quarto annual volume and illustrations. The falling off in the receipts has come from the old subscribers dying off, and new ones not being forthcoming to take their places, doubtless because the latter do not understand the advantages.

Glass 100 Feet in Thickness.—Among the numerous objects of interest discovered by the Geological Survey of America, remains of extinct animals and natural phenomena, not the least interesting, perhaps, is an obsidian cliff. This cliff is about half a mile long, by from 150 to 250 feet high, the material of which is said to be as good glass as any artificially manufactured. Its colours and structure, not only make it highly interesting, but furnish to the scientific investigator phenomena of importance. The cliff presents a partial section of a surface flow of obsidian, which poured down an ancient slope from the plateau lying east. It is impossible to determine what the original thickness of this flow may have been, but the dense glass which now forms its lower portion is from 75 to 100 feet thick, while the porous and pumiceous upper portion has suffered from ages of erosion and glacial action; a remarkable feature of the cliff is the development of prismatic columns. These are of shining black obsidian, rising from the talus slope, and are from 50 to 60 feet in height, with diameters varying from 2 to 4 feet. The colour of the material of the cliff is, for the most part, jet-black, but much of it is mottled, and streaked with bright brownish-red and various shades of brown and olive-green. In some places the material shows a fine satin lustre, while in others a deep golden sheen is noticeable, which, under the lens, resolves itself into thin beams of red and yellow light.—*Dipton Burn.*

Important Geological Discoveries in Australia.—A very important geological discovery has recently been communicated by Mr. C. S. Wilkinson, the Chief Geological Surveyor for New South Wales. It is connected with the dock excavations going on in Cockatoo Island, where the Hawkesbury sandstones are being quarried. Not only have fossil plants been found, but a small fossil shell, a Planorbis. The Planorbis is a freshwater shell; and there is a controversy going on concerning the origin of the Hawkesbury sandstone, which this little fossil shell may be required to give evidence upon. Encouraged by the above "finds," Mr. Wilkinson sent the collector to make further search, and he was rewarded by discovering the remains of the first fossil (Labyrinthodont) yet met with in Australia. These remains have been identified as those of a Mastodontosaurus, which, in Europe, is confined to the Lias formation.

Geological Pamphlets.—We have received Mr. F. C. J. Spurrell's elaborate "Sketch of the History of the Rivers and Denudation of West Kent" (illustrated); Dr. H. W. Crosskey's "Glacial Geology of the District around Loch Leven, Argyllshire," and the last Report of the Gold-fields of Victoria up to June 30, 1886.

Harris's "British Petrography."—Part ix. of this beautifully got up and most useful work is published with coloured plates, showing the microscopical structures of Plagioclase, Augite-Olivine rock, and Hornblendic Gabbro.

SCIENCE DIRECTORY.

Kendal Natural History Society.—Chairman, Rev. George Crewdson, M.A. Hon. secretaries: Joseph Severs, and George Cartnel, Kendal.

NOTES AND QUERIES.

Aquarium Notes.—One of your correspondents, Mr. J. Collins, in August, expressed surprise at the destructive habits of minnows. For a short time I have had an aquarium, and have also been surprised and astonished at these impudent fishes. I have tried various aquatic plants and grasses, but all to no purpose, they ate up and destroyed all, and even pulled them up by the roots. Dace are equally destructive, and I believe killed themselves by eating so much. I have been very much annoyed at the pertinacity of the minnows to devour everything. *Lemna minor* disappeared rapidly. I tried a few snails; Paludina seemed to hold out well, but succumbed. Planorbis holds out very well, but many have disappeared. *Limnæa stagnalis* have no chance whatever. I had a few beetles; Dytiscus, a diabolical rascal, harried the Limnæa very much also; but the minnows gave them no peace, they disappeared wholesale. The whirligig beetle, a very pleasing object, but no chance whatever, snapped up rapidly; although they contrived various modes of escape, their fastness and diagonal movement availed them nothing. Newts seem docile objects for the aquaria, but less interesting. Tadpoles far more interesting in the various changes. When the newt sheds his skin, the minnows often help him to divest himself and eat up the skin. The final struggle in mine seems to have been with the Dytisci, of which I had several. One day I found one destroying his brother in the coolest way—very soon demolished him. Two days afterwards, we found them all dead, as if there had been a keen battle. I have one large water beetle left, but he seems very inoffensive so far. The minnows and the beetle are in full possession. I have tried gold-fish, but failed with them. I should much like to know of some water-plant that minnows would not eat.—*H. D. O. F.*

Viviparous Lizard (*Zootoca vivipara*). — On July 21st, 1885, I caught a fine gravid female of this species of lizard as it lay basking in the sun in a drystone dyke. After killing it by putting it into my insect-killing cyanide bottle, where it was soon rendered unconscious and shortly died, I dissected it, and was surprised at the number of ova it contained, there being no fewer than fourteen, each of which contained a well-formed young lizard with a goodly portion of yolk and albumen, the envelope being membranous. Mr. Bell, in his "History of British Reptiles," says, "the usual number" of young brought forth by this lizard "is from three to six." Before dissecting the lizard, I took its dimensions, and made a short description of it; and, as it differs somewhat from the description of the female, as given by Mr. Bell, whilst in the coloration of the under surface it nearly agrees with that given by him for the male, I append it, thinking it may be of some interest to erpetologists. Dimensions: entire length, $5\frac{3}{4}$ inches; colour: the dorsal surface is lightish olive, bounded laterally by a narrow stripe or line of bright yellow, which is continued a little way along the tail, with a line of connected dark-brown spots along the median line, and a row of dark-brown smaller spots just within the narrow yellow lateral line. Sides of the body and head are dark-brown, bounded beneath by a narrow yellow stripe or line which commences beneath the eye, runs along the side of the head and neck; and thence along the side of the body in a line with the insertion of the limbs. The anterior limbs are entirely brown-coloured above; the posterior ones have a few small dull-yellow spots. The entire under-surface from the throat to the tip of the tail, including the limbs, is of an orange-yellow colour: the under-surface of the tail and the hinder limbs with a small portion of the posterior part of the abdomen, is speckled with black. Mr. Bell says, "The under side of the body and base of the tail in the male are bright orange, spotted with black; in the female these parts, as well as the tail, pale greyish-green, without spots." The four narrow stripes or lines of bright yellow, formed a striking feature in the coloration of the lizard, as it lay basking in the bright sunshine of the early evening.—*Charles Robson, Elswick, Newcastle-on-Tyne.*

Peculiar Prunella.—While visiting a friend in North-east Gloucestershire, I was introduced to a very queer variety of Prunella. Expressing a wish to see it growing, if possible, we started together to the top of one of the wolds, and there found the plant. It was too far gone in fruit for any one to be able to form a proper estimate of its peculiar characters. As near as we could see, they were as follows:—Root leaves, with petioles, $1-1\frac{1}{2}$ inch in length, and very much the shape of the ordinary form; stem slightly angled and hoary, with short stiff hairs, particularly at the angles. Calyx, as in ordinary form. Corolla, cream-coloured, almost yellow, large and full. Spike globose, with two lanceolate and two reniform bracts, opposite, in pairs; not quite so dense as ordinary form. Should be glad to know if this has been observed before by any of your readers?—*John Taylor.*

Albino Varieties.—*Epilobium hirsutum:* two patches; very strong and healthy, with pure white blooms; Quennington, Gloucestershire. *Epilobium montanum:* several tall plants; Swindon, Wilts. *Ononis arvensis:* one plant among several others of the ordinary colour; Blunsdon, Wilts. *Centaurea nigra:* pure white blooms; Green Hill, Fairford, and Kempsford, Gloucestershire. *Scabiosa arvensis:* rather weakly specimen, with white heads of bloom; the plant was covered with fungi; *Calluna vulgaris:* Woolford Heath, Gloucestershire, several plants. *Carduus nutans:* numbers of plants by hedgeside all with white blooms; Swindon, Wilts. With regard to *Epilobium hirsutum* I may state that all the white-flowered plants grow by the side of a small stream that carried off formerly the refuse of a paper-mill. Is it possible that this fact may in some way account for the change of colour?—*John Taylor.*

House-Flies.—A correspondent in Science-Gossip of September writes that "he and many friends have remarked the immense numbers of house-flies last summer." I can vouch for the same plague in this neighbourhood; but they did not come into the house. We have had a very cold, dry summer, a month late in vegetation. Queen-wasps were very numerous in April and May; hardly a wasp to be seen in the autumn I never remember such a scarcity. I remarked tadpoles in September at Pomeroy, co. Tyrone—is this unusual?—*S. A. Brenan.*

Light Attraction for Moths.—I have found light attraction for moths a decided success this season; but this is owing to the favourable situation of the house which I entered into last Christmas. My bedroom window overlooks a cornfield and a potato-field, and there is nothing to intercept the view for a long distance. In July and August, in particular, I reaped a good harvest of moths. On several occasions I sat up till two o'clock in the morning busily catching moths all the while, with the window open and the gas turned full on. In one

night I captured between 500 and 600, mostly Noctuæ, and including nearly seventy species, many of them of considerable rarity. The number of some species which entered was enormous, and proved a great nuisance. Since June, I have captured in this way nearly 250 species of Lepidoptera, besides a great number of other kinds of insects. I find that most moths come late at night, after all the lights in the neighbourhood have been extinguished, because so many lights cause a distraction, and one light, however brilliant, does not produce its full effect until it becomes conspicuous by its loneliness. The busiest time with the moths seemed to be just about midnight. They usually enter the room in batches of half a dozen or more, then perhaps there would be a lull for a few seconds until another lot would make its appearance. When they enter the room, after flying about for a while, they usually settle on the wall, where they can be easily captured. It is most amusing to see a great hawk-moth fly against the window, and with such a bang that one may almost imagine oneself to have been shot.—*W. Harcourt Bath, Sutton Coldfield.*

SUGARING IN 1886.—The recent season has been on the whole a decided success for sugaring in the Midlands. In July, in particular, the sugarings were well patronised by the moths. The result of one night's work in Sutton Park, I captured over thirty specimens of *T. batis*, besides a host of other rarities. The Heterocera have been rather abundant this season; but the Rhopalocera have not been so numerous in proportion. —*W. Harcourt Bath, Sutton Coldfield.*

CATS AND RABBITS.—I enclose a cutting from Keen's "Bath Journal" of 18th inst., on the subject of cats and rabbits crossing.—*G. A. Newman.*

Captain J. Buchan Telfer, R.N., writes from Spiez, Switzerland:—"Your correspondent at Melbourne mentions, on the authority of the "Wimmera Star," a curious freak of nature in the progeny of a tan cat and a black rabbit. It may be of some interest to naturalists and others if I state that, in the Hotel at St. Martin, Lantosque, in which I passed the summer of 1883, there was a creature, in colour pure white, having the head and forelegs of a cat, the hinder parts being those of a rabbit. The ears were likewise those of a rabbit. Its movements, somewhat laboured, were like a rabbit's, and when approached it would emit a discordant shriek. It was a remarkably timid animal, its sole and constant playmate a young terrier, the only person in the house from whom it would not seek to escape being the cook. It was born of a cat on the premises, but nothing was known of the male parent.

SCARCITY OF PARTRIDGES.—The following appears in a local Cumberland newspaper:—"The partridge shooting season in this district has been the most barren that has been experienced for many years. In the commencement of September the fields of grain were uncut, and now that the land has been cleared, the birds are so wild as to be almost unapproachable. Not a tithe of the number that were shot last year in a corresponding time have yet fallen to the sportsman's gun." This is an eminently lucky circumstance for the poor birds. This year's harvest in the northern districts, it may be observed, has been characterised by the excellence of the oat, potato, mangold, turnip, and carrot crops. Wheat has been a failure, while barley has been fair only. It would appear, therefore, that the safety and "whole-skinness" of our wild birds co-exist with the exuberance of the crop yielding the staple food for cattle, and with the penury of the chief article of human diet. This is a very interesting fact, challenging a more than cursory consideration. The poor birds get off scot-free, while man's granaries are unreplenished. The sporting and dietary luxuries of the higher classes are mulcted contemporaneously with the solid substantial food-necessities of the lower classes. This seems hardly fair on the part of Nature, especially when it be considered that the food stamina of cows, sheep, and pigs, etc., which yield meat for the rich man's table, are at the same time plenteously abundant. On the whole we see that in this year the rich are well fed on solid diet and deprived of luxury, while the poor are rendered deficient in necessaries. Has any reader of SCIENCE-GOSSIP ever before commented on this sort of provision of nature?—*P. Q. Keegan, LL.D.*

AIR-BLADDERS OF FISH.—Your correspondent "Mark Antony" has again misquoted Goldsmith. This time it is about the air-bladders of fish, which he introduces into his note on bees and poets, the association between which it is hard to see. The matter may be a trifling one, but "Science-Gossipers" are zealous for accuracy, and zealous of the reputation of the old masters of natural history. At p. 239, M. A. says, "Goldsmith makes quite as great a blunder when he tells us that the freshwater gudgeon and eel have no air-bladder." What Goldsmith does say will be found in his "History of Fishes," bk. i. c. 1, and is as follows—"Many fish are furnished with an air-bladder that continually crawl at the bottom, such as the eel and flounder; and many more are entirely without any bladder that swim at ease in every depth, such as the anchovy and fresh-water gudgeon." It is very funny that the only fact in the above, which the researches of modern society show to be correct, is the one which M. A. alters—viz. about the eel having an air-bladder. Nobody takes Goldsmith for an authority nowadays, still he did a good work in his time, and was not behind the naturalists of his period. It is to be hoped that the other quotations indulged in by "M. A." are a little more "remarkably correct" than his dealings with the author of the "History of the Earth and Animated Nature."—*H. W. Lett, M.A.*

SHOWERS OF SHELLS.—I had supposed that in these days of popular science the tales of "Showers of Snails," "Showers of Frogs," etc., had been consigned to the same oblivion as tales of witchcraft. I was much astonished, therefore, in July last, to find the "Western Morning News," a Plymouth daily paper of great and deserved repute, in the West of England, publish a circumstantial account of a "shower of snails" in the county of Cornwall, to find that account copied in nearly all the Devon and Cornwall local journals, and to see the same account in SCIENCE-GOSSIP for October. I thought I should for once like to trace the origin of one of these fabulous tales, and succeeded in getting the full particulars, as well as a sample of the shells, through the kindness of Mr. Thomas Cornish, solicitor, of Penzance; and, as I suspected, the shells turned out to be *Helix virgata*, and *Bulimus acutus*, species which have done duty before for similar phenomena. These two species live in myriads at the roots of grass and herbage, and at certain periods, after showers of rain, appear on the leaves and stalks to the astonishment of the rustics, who see these snails appearing in multitudes during rain without apparently coming from anywhere, and jump to the conclusion that they must have fallen with the rain. But, in truth, the snails are always there, and only require the necessary atmospheric stimulus to make them

appear. The facts, in short, are these:—A miner named Waters, working in Wheal Agar Mine, on arriving at his work there one morning, mentioned that, on his way home the previous evening, he had seen a shower of shells falling on the farm of Mr. Fredinnick, near Redruth. Captain Ralph Daniel, of the mine, immediately went with some of the men to the farm, where they found the whole of one field and parts of the several others, covered with these snails, and they arrived at the same conclusion as the miner. The only error in the above account is in the miner saying he saw them falling—a very simple error; but to what an extraordinary conclusion it leads! This explanation I forwarded to the "Western Morning News," which duly inserted it, and it was copied by most of the local journals that published the original account; and I trust, in this part of the country, at least, we shall not be edified with a similar account for some years to come. Your correspondent of last month seems to have been "fetched" by the tale, for he says—"It is unfortunate that attention was not directed to the phenomenon earlier, that it might have been observed whether there were any on the roofs of the cottages in the vicinity. This cannot be done now, as the abundant rains that have subsequently fallen would have washed them away." The *Helix virgata* is often to be found on the walls, and probably the roofs of cottages in suitable situations, and I lately saw thousands on a wall seven feet high, newly built within two months, without a particle of herbage at its base. The wall had been built on some meadow land, and the turf removed on either side and gravelled; the bare wall and gravel-walk crowded with these snails, giving an aspect that would appear extraordinary to any one not a naturalist.—*J. T. Marshall, Sevenoaks, Torquay.*

Gulls Roosting on Trees.—It is commonly asserted that the common seagull never perches on a tree. Going up Loch Lomond one Saturday not long ago, I noticed that a few gulls which had followed the steamer up the lake, took up their quarters upon some trees behind the Aard Lui hotel, and remained till Monday morning, when they escorted the boat on her return voyage.—*J. W. Slater.*

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—As we now publish Science-Gossip earlier than formerly, we cannot undertake to insert in the following number any communications which reach us later than the 8th of the previous month.

To Anonymous Querists.—We must adhere to our rule of not noticing queries which do not bear the writers' names.

To Dealers and others.—We are always glad to treat dealers in natural history objects on the same fair and general ground as amateurs, in so far as the "exchanges" offered are fair exchanges. But it is evident that, when their offers are simply disguised advertisements, for the purpose of evading the cost of advertising, an advantage is taken of our *gratuitous* insertion of "exchanges" which cannot be tolerated.

We request that all exchanges may be signed with name (or initials) and full address at the end.

F. E. Reed.—Rimmer's "Land and Freshwater Shells," each species photographed, price 10*s*. 6*d*.

C. E. Gubbins.—The echinoderm is the green pea urchin (*Echinocyamus pusillus*). The Trochuses are *T. umbilicatus*, young and old specimens.

M. Ratheone.—Your plant is a variety of the sea sand-wort spurrey (*Spergularia neglecta*).

Dr. Davidson.—The shell is a freshwater bivalve, *Pisidium amnicum.*

Dr. P. (Margate).—The insects in the bottle you sent us are the red house-ant (*Diplorhopton molesta*). See article on them in Science-Gossip for 1866 (December).

Dr. A. D.—You could not begin the study of land and fresh-water shells better than with Rimmer's "Manual," price 10*s*. 6*d*. (London: Allen & Co.) It contains photographs of every British species.

H. W. P.—You will have no difficulty in getting access to the Museum of the Royal College of Surgeons.

H. Allnutt.—Besides our own "Scientific Directory," which has been running throughout the present year, consult "Year-Book of Scientific Societies," published by Griffin & Co.

M. E. Thomson.—The "green rose" is a monstrosity, called phyllody of the petals, and is produced by the petals reverting to their leaf stage. "Green roses" are not uncommon.

K. A. D.—The fossil bones are, from your description, those of Diprotodon, which occur in the Australian river drifts as the Mammoth does in our valley gravels, and is of post-pliocene age. See Nicholson's "Palæontology."

A. P.—You will find an account of *Euplectella speciosa* in Science-Gossip for 1872, p. 180.

J. J.—Get the "Illustrated Dictionary of Scientific Terms," by W. Rossiter, published by W. Collins, Son & Co., London and Glasgow, at 3*s*. 6*d*.

A correspondent from Bath inquires whether a bull has a mind or not! He always has a mind to eat when he is hungry.

T. J. P.—Get Sowerby's "British Grasses," 1 vol., coloured plates, of some secondhand bookseller.

M. Johnson.—Get Dr. Wormell's "Treatise on Magnetism and Electricity," published by Murby, price 4*s*. 6*d*. For fungi, get Dr. M. C. Cooke's "British Fungi," published by Allen & Co., price 6*s*. For geology, Taylor's "Geological Stories" and "Common British Fossils" (latter published by Chatto & Windus).

W. Woods.—The series of articles "On Marine Collecting with the Surface-Net," commenced in March and were continued till June of the present year.

A. H. D.—From your rough sketch and description, we judge that the "mossy-looking" object is a species of Batrachospermum, a freshwater alga.

EXCHANGES.

Science-Gossip for 1866, 1868, and 1869, bound, and 1884, 1885, 1886, unbound; also British and foreign shells. Wanted, autographs, any of Ruskin's works, or offers.—S. C. Cockerell, 5 Priory Road, Bedford Park, Chiswick, W.

One dozen well-mounted physiological and pathological micro-slides for a similar number of good lantern photographs of microscopic objects.—D. Burford, Bowbridge, Stroud.

Nicholson's "Zoology," Turner's "Anatomy," Nettleship's "Diseases of the Eye," latest editions, new. What offers in books or micro apparatus?—G. A. Grierson, 74 Market Place, Sheffield.

Wanted, Parts 5 and 12 of vol. i. of the "Journal of Conchology." Offers requested. British shells and a few micro slides for exchange; lists sent.—J. W. Cundall, Carrville, Alexandra Park, Redland, Bristol.

Small collection of Indian shells in cabinet; microscopical exchange desired.—G. A. Barker, 1 Northwold Road, Clapton, E.

Sph. rivicola, P. nitidus, Cy. elegans, C. rugosa v. *dubia*, and others, for shells not in collection. Lists exchanged.—J. A. Hargreaves, Baildon Woodbottom, Shipley, Yorkshire.

Small air-pump for microscopical objects, not much used, cost £1 when new. What offers in glass slips, ground edges, 3 in. × 1 in., or spoiled slides, not scratched.—M. Farhall, 7 Lorna Road, West Brighton.

L. C., 7th ed., offered, 180, 194, 201*a*, 217, 273*c*, 317, 490, 533, 545, 553, 715, 856, 859, 907, 1300, 1332, 1613, 1615, 1616*b*, 1636, and many others. Wanted, 101, 103, 119, 174, 401, 477, 546, 665, 720, 721, 819, 830, 931, 971, 1005, 1081, 1292, 1299, 1302, 1552, and many others. Lists exchanged.—A. W. Preston, Thorpe Hamlet, Norwich.

Well-mounted slides of spicula of various sponges and Gorgonias in exchange for diatoms or diatomaceous earth.—J. B. Bessell, Freemantle Square, Bristol.

British or foreign dried plants, mosses, or micro slides for correctly-named and localised crystals, crystalline rocks, minerals, rare polarising salts, or good micro material.—J. Harbord Lewis, F.L.S., 145 Windsor Street, Liverpool, S.

Duplicates: *P. asterias* (♂, ♀), *P. troilius, Danais archippus* (♂, ♀), *Colias philodice* (♂, ♀), *Lycæna comyntus* (♂, ♀), *Chrysophanus Americana, Melitæa tharos, Catocala parta, C. concumbens*, and other species of American butterflies and moths; also cocoons of our larger species. Desiderata very numerous; English and exotic species of all kinds. Correspondence solicited from persons in all parts of the world.—Frank G. Jones, 1623 Montgomery Avenue, Philadelphia, Pa., U.S.A.

FERN fronds pressed. Wanted, specimens of *T. radicans*, *H. Wilsoni*, and *O. vulgatum*; have duplicates of *C. montana*, *C. alpina* (one), *A. lanceolatum* (several), *A. Germanicum*, *G. leptophylla*. R. Postans, Midhurst, Springfield Road, St. Leonards-on-Sea.

TWENTY specimens of cones, including *Cedrus Libanii*, *Pinus pinea*, *Abies spectabilis*, &c., collected in 1869, having attached collector's label, in perfect condition, in exchange for any of Ruskin's works, 1880 edition.—Rev. J. Buck, 87 London Road, Lowestoft.

"REPORT on Fauna of Liverpool Bay and Neighbouring Seas, 1886," edited by Professor Herdman, D.Sc., with ten plates and two maps, price 8*s.* 6*d.* Will exchange for good set of selenites prepared for the microscope.—H. Kendall, B.A., 17 Marmion Road, Liverpool.

HISTOLOGICAL slides for exchange; also cloth from Egyptian mummy, mounted as slide, great curiosity.—R. S. Stephens, 25 Fordwych Road, West Hampstead, London, N.W.

L. C., 7th edition, offered, 31, 57, 59, 67, 588, 595, 620, 699, 803, 1012 *b*, 1024, 1043, 1149, 1287, 1288, 1417, &c., in exchange for other rare British plants.—A. Sangster, Cattie, Oldmildrum, N.B.

WANTED, a secondhand cabinet to hold about 1000 slides. Exchange in books or micro material. Mounts of starches, human histology, &c., in exchange for insect eggs, &c.—W. Grierson, The Owens College, Manchester.

WANTED, Wood's book on Shells or Index Testaceologicus, or "Catalogue of Shells, British and Foreign," published 1828, in exchange for British shells, fossils, minerals, micro sections of Devonian corals, Polish slabs of Devon coral madrepores, &c..—A. J. R. Sclater, M.C.S., 23 Bank Street, Teignmouth, Devon.

WANTED, G. B. Sowerby's "Illustrated Index of British Shells." Will give good exchange in fossils, minerals, land and sea shells, and other curio ities.—A. J. R. Sclater, M.C.S., 23 Bank Street, Teignmouth, Devon.

MICROSCOPIC slides illustrating any science in exchange for apparatus, lanterns or slides, or scientific works.—S. Harrison, Dalmain Road, Forest Hill.

"VIOLIN MAKING," by Ed. H. Allen; "The Stamp Collectors' Handbook," by E. L. Pemberton; some good fishing-tackle and a rod, never used, for zoological and micro works. Wanted, Sachs' "Botany" (Trans.), Claus' "Zoology," and Nicholson's "Student's Manual of Zoology." Some duckbill hairs in exchange for zoological micro slides.—Miles Johnston, Oban House, Balham Park Road, Balham, S.W.

FIRST-CLASS microscopic slides in exchange for foraminifera, diatoms, fungi, leaves, and other unmounted material, large or small quantities.—Anderson, Ilkeston.

WANTED, book of ladies' fancy leatherwork; first-class micro slides in exchange, any class.—Anderson, Ilkeston.

MICRO slides: a number of brilliant wings of foreign Lepidoptera and other miscellaneous slides. Exchange other goods, slides, or material.—Mathie, 42 McKinlay Street, Glasgow.

OFFERED, turtle bone, rhinoceros horn, snake skins, insect scales, rose and bramble brand, and other unmounted objects for microscope, also duplicate British land and freshwater shells. Wanted, numerous British land and freshwater shells.—John R. B. Masefield, Rosehill, Cheadle, Staffordshire.

MUD containing foraminifera from Valentia, co. Kerry, in exchange for similar material from other localities.—Rev. A. H. Delap, Clonmel, Ireland.

A LOT of fossil shells, etc , from the Cooshaw river, offered in exchange for anything microscopic.—Kilgour, 2 Ogilvie's Road, Dundee, N.B.

PACKETS of 1 dozen unmounted micro-material assorted, in exchange for interesting slides. Wanted most mosses, etc. in fruit, spiral or other vegetable structure, rock and other hard sections, good insects or parts; not leaves, wood sections, or crystals.—J. E. Read, 44 Newmarket Street, Norwich.

WANTED Cassell's books on figure painting, animal drawing, and trees, in water colour; or any other works on painting, as Prout's "Landscape," by Ackerman, etc., in exchange for shells, fossils, or plants.—E. R. F., 82 Abbey Street, Faversham.

WILL Mr. David Smith, who replied to the offer of exchange of E. R. F., 82 Abbey Street, Faversham, oblige by sending his address (which he omitted) to E. R. F., as the letter E. R. F. wrote to him has been returned owing to insufficiency of address.

WELL-mounted slides of *Batrachospermum moniliforme* in fructification for exchange.—W. Stott, Lostock, Bolton.

WANTED, to borrow, a few at a time, Cook's plates of British fungi. Will pay reasonably for the loan, keep the plates clean, and defray all costs.—J. Harrison, 19 Victoria Road, Bedford.

OFFERED 12 packets of unmounted objects for other unmounted material.—W. Sim, Gourdas, Fyvie, N.B.

WHAT offers for two years' "Northern Microscopist"?—H. Vial, Crediton, Devon.

INJECTED tissues from rabbit, cat, guinea pig, snake, frog, mouse, monkey, etc., either in bulk or sections, for insect or botanical slides.—Henry Vial, Crediton, Devon.

DOUBLE-stained, tran-sections of dahlia, mimulus and lily, antlers, stigmas, and pollen, of malvaceæ, and other good slides, offered in exchange for other good mounts or good unmounted material; offers to—P. Kilgour, 2 Ogilvie's Road, Dundee, N.B.

LATHAM'S "Ethnology of the British Islands," 8vo., 1852; "Reign of Law," "Argyll," People's Ed. (sixteenth); "Rock-sculptures on Rombald's Moor," pamphlet, scarce; MS. list of Wakefield shells, for conchological books or pamphlets. Gray's "Turton's Manual" wanted.—Geo. Roberts, Lofthouse, near Wakefield.

WANTED, John's "British Birds in their Haunts," "Familiar Wild Birds," birds' eggs side-blown, Lepidoptera well set, common species. Exchange well set Lepidoptera, stuffed birds cased, well preserved.—J. Bates, 10 Orchard Terrace, Wellingborough.

WILL exchange for other books on botany, the following:—London's "Gardener's Magazine," 9 vols., complete; "Floricultural Cabinet" (coloured plates), 13 vols.; Loudon's "Encyclopedia of Gardening;" Maund's "Botanic Garden" (several parts); Linnæus, "Flora Lapponica," 1792; M'Intosh's "Practical Gardener;" Donovan's "British Insects" (coloured plates); "Magazine of Botany and Gardening;" Gordon's "Pinetum" (supplement); "A New Orchard and Garden House" (Black Letter), by Lawson, 1623; Abercrombie's "Practical Gardener;" Balfour's "Elements of Botany;" Wakefield's "Botany;" Culpepper's "Herbal;" "Popular Geography of Plants;" Newman's "Grammar of Entomology;" Withaung's "British Botany," 4 vols., complete; Hooker's "British Flora;" Rivers' "On the Rose;" Miller's "Gardener's Dictionary." Wanted, Loudon's "Arboretum," etc.; or works on trees, shrubs, etc.—A. D. Webster, Llandegai, Bangor.

WANTED, Howes' "Atlas of Biology," also a double or treble nose-piece, with universal screw for microscope; good exchange given.—H. W. Parritt, 103 Camden Street, Camden Town, N.W.

SWISS PLANTS—Dr. B. (care of editor of SCIENCE-GOSSIP) has a magnificent herbarium of dried plants, correctly named, to dispose of. Price 1*s.* each, in small or large numbers.

BOOKS, ETC., RECEIVED.

"United States Fish Commission: Report for 1883" (Washington: Government Printing Office).—"Poets in the Garden," by May Crommelin (London: T. Fisher Unwin).—"Microscopic Fungi," by M. C. Cooke, M.A., LL.D., A.L.S., fifth edition (London: W. H. Allen & Co.).—"Handbook of Historical Geology,' by A. J. Jukes-Browne, B.A., F.G.S. (London: George Bell & Sons).—"British Fungi," by Rev. John Stevenson (Edinburgh and London: William Blackwood & Sons). — "Studies in Comparative Anatomy. iii. The Structure and Life-History of the Cockroach," Miall and Denny (London: Lovell Reeve & Co.; Leeds: Richard Jackson).—"The Goldfield of Victoria." Reports of the Mining Registrars for June 1886 (Melbourne: Government Printer).—"Canadian Entomologist," vol. xviii. — "The Rochester Naturalist."—"Transactions of the Hertfordshire Natural History Society," vol. iv. parts 1–3.—"Liverpool Geological Association," Annual Report, 1886.—"Bedford Park Natural History and Gardening Society."—"Journal of Microscopy" (October 1886).—"Notes on the Glacial Geology of the District around Loch Sween, Argyllshire," by Henry W. Crosskey, LL.D., F.G.S.—"Vox Clamantis: the Poet Laureate," by Eric Mackay.—"How Plants Climb," by H. W. S. Warsley-Benison, F.L.S.—"Coming Deluge of Russian Petroleum," by Charles Marvin.—"A Sketch of the History of the Rivers and Denudation of West Kent, etc.," by F. C. J. Spurrell.—Cole's "Studies in Microscopical Science."—"Journal of Royal Microscopical Society." — "Proceedings of American Academy." — "The Amateur Photographer."—"The Camera."—"The Scientific Enquirer."—"The Garner."—"The Naturalist."—"The Botanical Gazette."—"Journal of the New York Microscopical Society."—"Belgravia."—"The Gentleman's Magazine."—"Le Monde de la Science."—"American Monthly Microscopical Journal." — "The Midland Naturalist." — "Feuille des Jeunes Naturalistes."—"The American Naturalist."—&c. &c.

COMMUNICATIONS RECEIVED UP TO THE 13TH ULT. FROM: E. A. S.—H. A.—Dr. R. L.—W. R.—W. C. F.—J. A. F.—R. P.—J. S.—F. E. R.—J. B.—J. S.—C. S. W.—H. S. L. N. H.—J. H. M.—G. F. G.—G. A. B.—L. L.—W. L'A. C.—E. L.—J. W. S.—M. A.—J. W. C.—R. H. N. B.—H. M.—H. W. K.—C. H. W.—E. W. M.—D. B.—G. A. G.—A. T.—E. B.—J. A. H.—A. W. P.—J. H. L.—J. B. B.—M. L. S.—W. L. W. E.—M. F.—Dr. P.—E. A. P.—T. W.—K. H.—R. S. S.—Rev. J. B.—H. C. E. V.—F. G. J.—A. J. R. S.—J. J.—W. G.—W. C.—T. D. A. C.—D. B.—A. L.—T. J. G.—J. H. A.—A. P.—C. R.—Rev. A. H. D.—J. R. B. M.—W. M.—W. S. A.—S. H.—M. J.—W. S.—H. V.—R. P.—H. J. B.—E. R. F.—W. D. W—P. K.—J. H.—W. S.—G. R.—J. E. R.—J. B.—J. W. K.—M. D.—W. A. S.—&c. &c.

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